UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
Crops Research Division
Oilseed and Industrial
Crops and Crops Protection
Research Branches

BIBLIOGRAPHY OF SOYBEAN DISEASES

Compiled by

D. W. Chamberlain, Research Plant Pathologist
B. R. Lipscomb, Agricultural Research Technician

CR-50-67

JULY 1967

BIBLIOGRAPHY OF SOYBEAN DISEASES

D. W. Chamberlain and B. R. Lipscomb

This bibliography is designed to bring up to date the literature on diseases of soybeans caused by bacteria, fungi, and viruses. Since Lee Ling's Bibliography of Soybean Diseases, published as Supplement 204 of the Plant Disease Reporter, June 15, 1951, covered the literature up to that time very adequately, the year 1951 was the starting point for the present bibliography in regard to bacterial and fungal diseases. The year 1957 was the starting point for viral diseases, since literature previous to that year was covered by the Bibliography of Viruses Infecting the Soybean by Kreitlow et al, Plant Disease Reporter 41: 579-588, July 15, 1957. The literature on nutritional disorders is not included here, since these problems lie more properly in the province of physiology. Nematode diseases will be covered in a later publication.

For the information of future bibliographers, the present search in the Bibliography of Agriculture terminated with the September, 1965, issue. The search for titles in the Review of Applied Mycology, Phytopathology, and the Plant Disease Reporter terminated with the June, 1965 issues. Although over 470 titles are listed, we realize that omissions are inevitable and would appreciate being informed of any that come to the reader's attention.

Titles in the annotated bibliography are listed numerically in alphabetical order according to the author's name. The Appendix lists the scientific names of causal organisms, synonyms, and numerical reference to pertinent literature in the bibliography. Common names of diseases and causal organisms are cross-listed for the convenience of readers with limited mycological background, and for those less familiar with organisms involved in soybean diseases.

Reprints of this bibliography may be obtained from Leader, Soybean Investigations, Crops Research Division, Beltsville, Maryland, from D. W. Chamberlain, U. S. Regional Soybean Laboratory, 160 Davenport Hall, Urbana, Illinois, or from B. R. Lipscomb, Epidemiology Investigations, Crops Protection Research Branch, Beltsville, Maryland.

1. ABE, T., and M. KONO. 1953. Studies on the white root-rot of tea bush. I. Saikyo Univ. Fac. Agr. (Kyoto, Japan), Sci. Rpts. 5: 93-105. English text.

Three cultural strains of Rosellinia (two from tea and one from ramie) inoculated into soil inhibited germination of soybean seeds to about 45%. From microscopical observations of cross sections of infected seed, the seeds were thought to be killed by some substances secreted from the fungus hyphae.

2. ACIMOVIC, M. 1963. The response of an assortment of soybeans to the occurrence of wilting caused by Sclerotium bataticola Taub. Savremena Poljoprivreda 11: 899-904. Croatian text, short English summary.

A survey in Voivodina (Northeastern Yugoslavia) of 141 varieties for natural infection showed 30 to be completely immune, 50 highly resistant, and 61 highly susceptible.

3. ACIMOVIC, M. 1963. Sclerotium bataticola Taub. as a parasite on soybean in Yugoslavia. Savremena Poljoprivreda 11: 271-280. Croatian text, English summary.

First report of this disease on soybeans for Yugoslavia. Often over 50% of the plants are affected. Early planting and early maturing resulted in the greatest infection. Most rapid mycelial growth was on potato dextrose agar and on agar with onion and oats, and likewise the most rapid production of sclerotia. Optimum temperature for development was 30°C., minimum 10-15°C. and maximum, 35-40°C. Sclerotia were smallest at 30°C. and largest at 15 and 35°C.

4. ANCALMO, O. 1959. (A preliminary list of parasitic diseases of plants of El Salvador.) Serv. Coop. Agr. Salvadoreno Amer., Bol. Tec. 22. 29pp. Spanish text.

Powdery mildew and other diseases listed for several genera of legumes including soybeans without listing specific hosts. (p. 12).

5. ANDREWS, E. A. 1950. Brief notes on plant diseases. Stem blight of soybeans in Michigan. Plant Dis. Rptr., 34: 214.

Diaporthe phaseolorum var. batatatis:

Stems were exposed to the weather during the winter and clusters of perithecia and ascospores developed but no pycnidia or conidia.

6. ANDREWS, F. W. 1947. The parasitism of Striga hermonthica Benth. on leguminous plants. Ann. Appl. Biol. 34: 267-275.

Experiments were made to find what leguminous plants were suitable for cleaning Striga-infested soils. Soybean plants of the black-seeded variety have the ability to germinate Striga seeds but it appears that the soybean plant interposes a definite resistance to penetration by haustoria of the parasite. (pp. 270-272).

7. ARMSTRONG, G. M., and J. K. ARMSTRONG. 1965. A wilt of soybean caused by a new form (glycines) of Fusarium oxysporum. Phytopathology 55: 237-239.

8. ARSENIJEVIC, M., and B. KOSTIC. 1960. A contribution to the study of Peronospora manshurica (Naum.) Syd. Zashtita Bilja 62: 139-144. Croatian text, short English summary.

Since the cultivation of soybeans has increased in recent years in Yugoslavia, this disease has become common and dangerous during the entire growing season. Blackhawk and Goldsoy were the most heavily attacked.

9. ASHBY, S. F. 1927. Macrophomina phaseoli (Maubl.) comb. nov., the pycnidial stage of Rhizoctonia bataticola (Taub.) Butl. Brit. Mycol. Soc., Trans. 12: 141-147.

Taxonomy is discussed and 9 synonyms are listed. A good survey of the literature is given.

10. ATHOW, K., and A. H. PROBST. 1952. The inheritance of resistance to frog-eye leafspot of soybeans. Phytopathology 42: 660-662.

Resistance is conditioned by a single dominant Mendelian factor.

11. ATHOW, K. L., and R. M. CALDWELL. 1954. A comparative study of Diaporthe stem canker and pod and stem blight of soybean. Phytopathology 44: 319-325.

The authors retain the trinomial Diaporthe phaseolorum var. sojae as the valid name for the fungus causing pod and stem blight. Stem canker is described and the causal organism designated as D. phaseolorum var. caulivora n.v.

12. ATHOW, K. L. 1957. Studies of soybean infection by the stem canker fungus. Abs. in Phytopathology 47: 2.

Observation on Diaporthe phaseolorum var. caulivora over 8 years in Indiana showed that stem lesions never appeared until soybean plants were 62 days old, regardless of the date of planting; in 31 of 40 plantings the incubation period was 70 to 80 days, though half the 28-day-old and 85 percent of the 35-day-old artificially inoculated plants were infected. All natural infection is by the leaf blades, or at the junction of the leaflet and petiole. Removal of the first 6 trifoliate leaves before plants were 58 days old stopped infection, which in adjacent plants eventually amounted to 36 percent. (Rev. Appl. Mycol. 36: 372. 1957.)

13. ATHOW, K. L., and J. B. BANCROFT. 1959. Development and transmission of tobacco ringspot virus in soybean. Phytopathology 49: 697-701.

Up to 100% seed transmission observed. The efficiency of seed transmission depends on time of infection of the plant. The virus is not soil-transmitted and seed-transmission does not, under field conditions, account for the rapid increase of the disease during epiphytotics.

14. ATHOW, K. L., and F. A. LAVIOLETTE. 1961. The relation of seed-transmitted tobacco ringspot virus to soybean yield. Phytopathology 51: 341-342.

No significant reduction in yield was noted when less than 50% of the seed came from infected plants. Concluded that infected seed is of no consequence in reducing yields.

15. ATHOW, K. L., and F. A. LAVIOLETTE. 1962. Relation of seed position and pod location to tobacco ringspot virus seed transmission in soybean. Phytopathology 52: 714-715.

No relation between seed position or pod location to seed transmission of the virus.

16. ATHOW, K. L., A. H. PROBST, C. P. KURTZMAN, and F. A. LAVIOLETTE. 1962. A newly identified physiological race of Cercospora sojina on soybean. Phytopathology 52: 712-714.

Race 2 found on Clark and Wabash in 1959. Varieties resistant to both Races 1 and 2 are CNS, Dorman, Hood, Kanrich, Kent, Kim, Lee, Ogden, and Roanoke.

17. ATKINS, J. G., and W. D. LEWIS. 1954. Rhizoctonia aerial blight of soybeans in Louisiana. Phytopathology 44: 215-218.

18. AVERE, C. W., and K. L. ATHOW. 1964. Host-parasite interaction between Glycine max and Phytophthora megasperma var. sojae. Phytopathology (Abs.) 54: 886-887.

Clear-cut resistant or susceptible reactions on soybean varieties were obtained only when highly virulent isolates were used. Weakly virulent isolates caused either non-killing lesions or no lesions. Resistance in Mukden was conditioned by a single dominant gene, Ps, and the recessive allele, ps, governed susceptibility in Dunfield and Harosoy.

19. BAKER, C. F. 1914. The lower fungi of the Philippine Islands. A bibliographic list chronologically arranged, and with localities and hosts. Leaflets Philippine Bot. 6: 2065-2190.

Uromyces sojae Syd. collected by the author at Los Baños. First report for the Philippines. (p. 2077)

20. BANCROFT, J. B., and J. L. KEY. 1964. Effect of Actinomycin D and ethylenediamine tetraacetic acid on the multiplication of a plant virus in etiolated soybean hypocotyls. Nature (London) 202: 729-730.

Bean pod mottle virus. The results are consistent with the idea that the multiplication of an RNA plant virus is largely independent of the normal avenues of RNA synthesis and maintenance in plant cells. Work done at Purdue University.

21. BATTLE, W. R., and J. L. PETERSON. 1961. Plan expanded research on soybean disease problems. N. J. Agr. 43(3): 3-5.

22. BAZAN de SEGURA, CONSUELO. 1947. (Some fungi of Peru.) Lima, Peru. Estac. Expt. Agr. de La Molina, Bol. 33, 28pp. Spanish text.

Sclerotium rolfsii Sacc. isolated from roots of diseased plants at La Molina. Macro- and micro-characteristics are given. (pp.9-10)

23. BAZAN de SEGURA, CONSUELO. 1953. (Principal diseases of plants in Peru). Lima, Peru Estac. Expt. Agr. de La Molina Bol. 51. Spanish text.

States that seed should be treated with special fungicides for control of damping-off (Rhizoctonia sp.).

Reports the occurrence of Sclerotium rolfsii and suggests as a control: avoid excessive moisture and densely sown crops. (p. 35).

24. BAZAN de SEGURA, CONSUELO. 1957. New hosts of Macrophomina phaseoli in Peru. Plant Dis. Rptr. 41: 814.

M. phaseoli has been found in Peru on castor bean (Ricinus communis) and a 3-year-old olive tree.

25. BAZAN de SEGURA, CONSUELO. 1959. (Principal Plant Diseases in Peru.) 70pp. Spanish text.

Symptoms of powdery mildew (Erysiphe polygoni) and control similar to those of powdery mildew of beans. Pathological notes on Rhizoctonia sp. (damping-off) and Sclerotium rolfsii (wilt). (p. 58).

26. BEDI, K. S. 1961. Factors affecting the viability of sclerotia of Sclerotinia sclerotiorum (Lib.) de Bary. Indian J. Agric. Sci. 31: 236-245.

At U. of Minn. sclerotia resisted exposure to: 1 hr. in 1% CuSO and 1% Na hypochlorite; 30 min. in 0.1% HgCl, 1% formalin, or absolute alcohol; dry heat at 70° for 6 hrs., treatment at 60° stimulating the production of vigorous sclerotium-producing colonies on germination; 10 min. in conc H_2SO_4; freezing, freezing and thawing, wetting and drying, immersion in water for two months at 5-30°; and dry storage for 18 months. They were killed by 5 minutes' immersion in water at 50° C., by burial in compost heaps at 30-55°, and by attack of other organisms, particularly Aspergillus flavus, in sterilized and unsterilized soil. (Taken from abst. in Rev. Appl. Mycol. 42: 244. 1963).

27. BENEDICT, W. G., and A. A. HILDEBRAND. 1958. The application of chromatographic methods to a study of the susceptibility of soybean to stem canker. Canad. J. Plant Sci. 38: 155-163.

28. BENEDICT, W. G. 1964. Studies on the effect of Pseudomonas glycinea on Septoria glycines development on foliage of the Harosoy soybean grown under controlled environmental conditions. Canad. J. Bot. 42: 1135-1142.

In growth chambers with day and night temperatures of 80 and 72°F. respectively 100% relative humidity and 14 hr. day length and illumination of 1100 f.c. at 16 in. above the plants, there was a marked increase in brown spot (Septoria glycines) in the presence of bacterial blight (Pseudomonas glycinea) resulting from a synergistic reaction between the two pathogens.

29. BERGESON, G. B., K. L. ATHOW, F. A. LAVIOLETTE, and SISTER MARY THOMASINE. 1964. Transmission, movement, and vector relationships of tobacco ringspot virus of soybean. Phytopathology 54: 723-728.

Limited transmission to soybeans by thrips was demonstrated.

Xiphinema americanum readily transmitted TRSV from infected soybean or cucumber to cucumber but only rarely to soybean.

Movement of the virus from leaves to roots was rapid and common; movement from roots to leaves was rare and slow.

30. BERNARD, R. L., P. E. SMITH, M. J. KAUFMANN, AND A. F. SCHMITT-HENNER. 1957. Inheritance of resistance to Phytophthora root and stem rot in the soybean. Agron. J. 49: 391.

Resistance controlled by a single dominant gene.

31. BERNARD, R. L., A. H. BROBST, AND L. F. WILLIAMS. 1964. New disease-resistant soybean varieties developed by backcrossing. Soybean Digest 24: 10-11.

Describes the development of the Phytophthora-resistant varieties Hawkeye 63, Harosoy 63, Clark 63, Lindarin 63, and Chippewa 64.

32. BHARGAVA, S. N., and R. N. TANDON. 1963. Vitamin requirements of three pathogenic fungi. Path. et Microbiol. 26: 313-317.

An external supply of vitamins had practically no effect on growth of Macrophomina phaseoli but there was a slight variation in reproduction. (Univ. Allahbad, India).

33. BHATT, V. V., and M. K. PATEL. 1955. Comparative study of species of Xanthomonas parasitizing leguminous plants in India. Indian Phytopath. 7: 160-180.

Twelve Xanthomonas spp. were compared on various media. A provisional classification of the 12 species is given on the basis of carbon utilization, cultural, and biochemical responses. A host range study includes 52 plant taxa.

34. BITANCOURT, A. A. 1934. (Report on the diseases and parasitic fungi observed in the phytopathological section during the years 1931 and 1932.) São Paulo Inst. Biol., Arq. 5: 185-196. Portuguese text.

A bacterial spot assumed to be caused by Bacterium glycineum Coerper. (p. 194).

35. BITANCOURT, A. A. 1938. Brazil: diseases of cultivated or useful plants, observed in the State of São Paulo. Internatl. Bull. Plant Protect. 12: 49-54.

Bacterium glycineum was one of the pathogens studied at the Laboratory of Plant Pathology of the Institute of Biology, São Paulo, between 1931 and 1936. (p. 51)

36. BOEDIJN, K. B. 1960. The Uredinales of Indonesia. Nova Hedwigia 1: 463-496. English text.

Uromyces sojae collected in Java, Aug./Sept., 1949. (p. 477)

37. BOEWE, G. H. 1963. Host plants of charcoal rot disease in Illinois. Plant Dis. Rptr. 47: 753.

38. BOJŇANSKY, V. (Editor) 1963. (Virus Diseases of Plants.) 542 pp. Bratislava, Czechoslovakia. (Czech text.)

Compiled by 10 Czech authors, has a general section on all phases of virus research. Following this section is one in which individual diseases are discussed including the following viruses to which soybeans are mentioned as being susceptible: Abutilon infectious variegation (p. 419); bean phyllody (p.267); bean pod mottle (p.267); bean southern mosaic (p.266); bean yellow mosaic (p.264); bean yellow stipple (p.266); broad bean mottle mosaic (p. 274); ladino clover yellow patch (p.280); lucerne mosaic (p. 281); pea enation mosaic (p. 268); pea streak (p. 272); soybean mosaic (p. 275-276); and tomato aspermy disease (p. 299).

39. BONDARTZEVA-MONTEVERDE, V. N., and N. I. VASSILEVSKI. 1940. A contribution to the biology and morphology of some leguminous Ascochytae. Akad. Nauk SSSR. Bot. Inst., Trudy Ser. II Sporovye Rast. 4: 345-376 [1938 ([1940). Russian text, English summary.

Morphological, cultural, and inoculation studies were made in relation to the taxonomic status of Ascochyta sojaecola Abramoff. When 22 other legumes were inoculated, only 11 were slightly infected. Even soybean showed but slight infection when inoculated.

40. BONTEA, VERA. 1953. (Parasitic and Saprophytic Fungi of Rumania). 637 pp. Rumanian text.

Reports the occurrence of Peronospora manshurica in Rumania. (p. 265)

41. BOOSALIS, M. G., and R. I. HAMILTON. 1957. Root and stem rot of soybean caused by Corynespora cassiicola (Berk. & Curt.) Wei. Plant Disease Rptr. 41: 696-698.

Symptoms: circular to oval dark reddish-brown lesions on the hypocotyl, tap roots and larger lateral roots, approx. 2.5 mm. in diam. (on plants of Hawkeye and Lincoln in the 2-leaf stage). No symptoms on the cotyledons or leaves.

With increasing age of the infected plants the lesions enlarge in size and in many cases cause girdling of the tap root and adjacent stem tissue. Lesions on the lateral roots also elongated and often coalesced to cause discoloration of the entire root. With the onset of sporulation of the pathogen, the lesions of all infected tissues changed from reddish-brown to a dark violet-brown color. Severely infected plants are slightly stunted with no other symptoms developing on the aerial parts of the plant.

The pathogen is superficial, confined to the outer cells of the cortex. The disease is considered of little economic importance.

42. BORTELS, H. 1958 (On the connection between "wildfire" of tobacco caused by Pseudomonas tabaci (Wolf & Foster) Stevens, fluctuations in atmospheric pressure, and solar activity.) Phytopath. Zeitschr. 33: 403-425. German text. English summary.

When falling atmospheric pressure (cyclonic disturbances) occurred during the preparation of the culture medium, followed by rising pressure (anticyclonic developments) during and after the development of the bacteria, the pathological symptoms were increased. They were reduced or suppressed altogether when reverse conditions prevailed at these times.

43. BOS, L., D. J. HAGEDORN, and L. QUANTZ. 1960. Suggested procedures for international identification of legume viruses. Tijdschr. over Plantenz. 66: 328-343.

Suggests the adoption, on an international basis, of a recommended list of hosts including genus, species, and variety. These would be made available to researchers throughout the world, and with the same hosts in use throughout the world, results would be more meaningful.

44. BOS, L. 1964. Tentative list of viruses reported from naturally infected leguminous plants. Netherlands Jour. Plant Path. 70: 161-174.

A proposal of the standardization in the use of common or vernacular virus names. Abutilon mosaic and soybean mosaic are listed as affecting soybeans.

45. 1963. BOTANY, PLANT PATHOLOGY AND SEED SERVICES. Rhodesia & Nyasaland Min. Agr., Rpt. of the Sec. 1961/62: 46-55.

Cercospora kikuchii, causing blue stain on soybean seeds, is a new record for the Federation of Rhodesia & Nyasaland. Bacterial blight was commonly encountered. Inspection of crops in variety trials showed that several varieties were infected by soybean mosaic virus. The variety Hood carried a very heavy infection. (p. 50)

46. BRANDES, J., and C. WETTER. 1959. Classification of elongated plant viruses on the basis of particle morphology. Virology 8: 99-115.

Soybean mosaic virus: normal length, 750 mμ.; Shape, flexible threads; diameter, 12-13 mμ.; transmission by aphids and sap; thermal inactivation point, 50-60°C.

47. BRAUN, ARMIN C. 1955. A study on the mode of action of the wildfire toxin. Phytopathology 45: 659-664.

Physiological and chemical studies indicate that the toxin associated with the wildfire disease of tobacco is a structural analogue of methionine that owes its biological activity in one and perhaps all susceptible plant species to its behavior as a naturally occurring anti-metabolite of that essential amino acid.

48. BRIEN, R. M. 1932. Host range of Sclerotinia sclerotiorum in New Zealand. New Zeal. Jour. Agr. 44: 127-129.

Attacks soybean stems on which it produces round, black sclerotia.

49. BROWN, E. 1964. Effect of oxygen concentration on Pythium seedrot of soybean. Phytopathology (Abs.) 54: 889.

49A. BRUDNAIA, A. A. and E. D. IAKIMOVICH. 1938. (Principle measures for protection of soybeans from pests and diseases.) Moscow Vsesoiuz. Nauch.-Issled. Inst. Severnogo Zernovogo Khoz. I Zernobob. Kul'ture, Trudy 3: 116-135. Russian text.

50. BRUNER, S. C. 1921. (A preliminary list of the plant diseases of economic importance for Cuba.) Cuba Estac. Expt. Agron., Informe 1918/19 & 1919/20, (5th): 723-763. Spanish text.

A bacterial disease, evidently attributed to Bacterium glycineum, has been observed in seed plantings at the Agronomy Experiment Station of Cuba causing considerable damage. (p. 760)

51. BUCHWALD, N. F. 1947. (Sclerotiniaceae of Denmark. A floristic-systematic survey of the sclerotial cup fungi found in Denmark. Part I. Ciboria, Rutstroemia, Myriosclerotinia n.g., and Sclerotinia.) Friesia 3 (4): 235-330. Danish text.

Specimen of Sclerotinia sclerotiorum collected Sept., 1941. Nomenclature, culture, and history of the fungus in Denmark are discussed. (p. 327).

52. BUSHONG, J. W., and J. W. GERDEMANN. 1959. The relationship of culture substrate to staining of Phytophthora species with zinc-chlor-iodide. Phytopathology 49: 455-456.

53. CALVERT, O. H., L. F. WILLIAMS, and M. D. WHITEHEAD. 1960. Frozen lima bean agar for culture and storage of Phytophthora sojae. Phytopathology 50: 136-137.

18% frozen lima beans, 1.5-2.0% agar, 1 liter dist. H_2O. Blend beans in water in Waring blendor, add agar, and autoclave for 30 minutes. Tube or pour into flasks without filtering and reautoclave. Keep agar out of light, since light turns the medium yellow.

54. CAPOOR, S. P., and P. M. VARMA. 1956. Studies on a mosaic disease of Vigna cylindrica Skeels. Indian Jour. Agr. Sci. 26: 95-103.

Catjang mosaic virus inoculated mechanically to soybean produces a faint mosaic and discoloration of the leaves which are reduced in size.

55. CAPPELLINI, R. A. 1959. Brown spot of soybeans in New Jersey. Plant Dis. Rptr. 43: 287.

Septoria glycines.

56. CASTANO, J. J., and M. F. KERNKAMP. 1956. The influence of certain plant nutrients on infection of soybeans by Rhizoctonia solani. Phytopathology 46: 326-328.

Severity of infection with two physiologic races of Rhizoctonia solani was enhanced by the absence of iron, sulfur, and nitrogen, but not by potassium. Nitrogen and iron deficiency were also associated with a high incidence of infection.

57. CHAMBERLAIN, D. W., and B. KOEHLER. 1951. Soybean diseases in Illinois. Ill. Col. Agr., Ext. Circ. 676.

Descriptions of symptoms.

58. CHAMBERLAIN, D. W. 1951. Sclerotinia stem rot of soybeans. Plant Dis. Rptr. 35: 490-491.

59. CHAMBERLAIN, D. W. 1951. Resistance to bacterial blight in soybeans. (Abs.) Phytopathology 41: 6.

Highly diluted inoculum induced chlorosis only on the resistant strains; at the same dilution, susceptible varieties developed typical blight symptoms. Bacterial multiplication increased rapidly three to four days after inoculation in the susceptible variety, and much more slowly in the resistant strains.

60. CHAMBERLAIN, D. W. 1952. A halo-producing strain of Pseudomonas glycinea. Phytopathology 42: 299-300.

Report of a strain of the organism that produces halos around the necrotic spot on soybean leaves.

61. CHAMBERLAIN, D. W. 1953. Disease reaction in relation to inoculum dilution in bacterial blight of soybean. (Abs.) Phytopathology 43: 468.

Inoculum dilution of 8 million cells per ml. was satisfactory for field inoculations but 1:10 to 1:100 dilutions of this suspension gave better differentiation between resistant and susceptible strains in the greenhouse.

62. CHAMBERLAIN, D. W., and D. F. McALISTER. 1954. Factors affecting the development of brown stem rot of soybean. Phytopathology 44: 4-6.

Brown stem rot progressed more rapidly in plants beyond the pod-filling stage than in younger plants irrespective of temperature. High day temperature (32° C.) had much the same inhibiting effect on fungus growth as high constant temperature. The rate of water flow in soybean stems was inversely related to the degree of browning in the vascular system.

63. CHAMBERLAIN, D. W. 1956. Pathogenicity of Pseudomonas tabaci on soybeans and tobacco. Phytopathology 46: 51-52.

Tobacco isolates were more pathogenic on tobacco than were isolates from soybean. The reverse was true for soybean isolates, but differences were less pronounced. Ps. tabaci appears to be a less virulent primary parasite on soybean than on tobacco.

64. CHAMBERLAIN, D. W. 1956. Methods of inoculation for wildfire of soybean and the effect of bacterial pustule on wildfire development. Phytopathology 46: 96-98.

Wildfire infection developed best when Pseudomonas tabaci was associated with the bacterial pustule organism (Xanthomonas phaseoli var. sojensis) in soybean leaves. Wounding was ineffective, as was spraying the leaves lightly with inoculum without watersoaking. Watersoaking healthy leaves with wildfire inoculum alone resulted in erratic infection.

65. CHAMBERLAIN, D. W. 1957. Maintaining bacterial organisms in soybean leaves. Plant Dis. Rptr. 41: 1039-1040.

Pseudomonas tabaci remained viable and pathogenic in soybean leaves (infected) stored at 5-7°C. for 3 1/2 years, and P. glycinea for 7 years.

66. CHAMBERLAIN, D. W. 1961. Reduction in water flow in soybean stems by a metabolite of Cephalosporium gregatum. Phytopathology 51: 863-865.

67. CHAMBERLAIN, D. W. 1962. Reaction of resistant and susceptible soybeans to Xanthomonas phaseoli var. sojensis. Plant Dis. Rptr. 46: 707-709.

68. CHAMBERLAIN, D. W. 1963. Spot and stop soybean diseases. II. The roots and stems. Crops and Soils 15(8): 16-17, 20.

69. CHAMBERLAIN, D. W., and J. W. GERDEMANN. 1966. Heat-induced susceptibility of soybeans to Phytophthora megasperma var. sojae, Phytophthora cactorum, and Helminthosporium sativum. Phytopathology 56: 70-73.

Resistant Harosoy 63 soybeans became susceptible to P. megasperma var. sojae after 1 hr. at 43-45°C. After the same heat treatment, soybeans became susceptible to 2 non-pathogens of soybeans, P. cactorum and Helminthosporium sativum; heat-treated plants were not susceptible to the saprophytes Trichoderma viride, Aspergillus niger, and Chaetomium globosum.

70. CHANDRASRIKUL, A. 1962. A preliminary host list of plant diseases in Thailand. Thailand Dept. Agr., Tech. Bull. 6. 23pp.

Fusarium wilt, Sclerotium rolfsii (root rot), and Macrosporium sp. (leaf spot) on Glycine max. (p. 7)

71. CHATTOPADHYAY, S. B., and C. R. DAS. 1956. The occurrence of some virus diseases of agricultural crop plants in West Bengal. Bot. Soc. Bengal, Bull. 9: 42-45. 1955 (1956)

Wherever soybeans are cultivated in the plains regions, they become badly infected with a "mosaic" disease. In the hills, the crop does not suffer from any virus disease.

72. CHAUDHURI, R. P. 1950. Studies on two aphid-transmitted viruses of leguminous crops. Ann. Appl. Biol. 37: 342-354.

Pea enation mosaic virus, apparently, but not definitely identified on soybean. (Rothamsted Expt. Sta., England)

73. CHEO, C. C., and S. L. TSAI. 1959. Virus diseases of legumes (annual report, 1957-1958). Acta Phytopath. Sinica 5(1): 7-11. Chinese text, English summary.

Seed transmission of soybean rugose mosaic is reported. A yellowing of alfalfa was sap-transmissable to soybean.

74. CHONA, B. L., and R. L. MUNJAL. 1956. Notes on miscellaneous Indian fungi - III. Indian Phytopath. 9: 53-66.

Mycosphaerella phaseoli is a new species (reported on Phaseolus aureus only) of which the conidial stage description agrees with Cercospora kikuchii Matsu. & Tomoyasii which has been recorded on soybeans. Although no organic connection has been established between the ascigerous and conidial stages, the presence of both in the same spots and also the fact that some perithecia were often seen bearing conidiophores resembling those of Cercospora kikuchii suggest that these are two stages of the same fungus.

75. CHONA, B. L., AND R. L. MUNJAL. 1957. Cicinnobolus cesati DeBary: hyperparasite of powdery mildews in India. Indian Phytopath. 9: 98-105.

Cicinnobolis cesati is reported as parasitizing Oidium sp. on Glycine javanica. Mildew spots, mostly single, rarely 2 or more together, were on both leaf surfaces, though more commonly on the upper. Mildew patches gradually became dark brown due to the appearance of the hyperparasite. Specimens collected in Madura district, South India at 8,000 ft. Pycnidia and pycnospores are described.

76. CHU, H. T., and C. CHUANG-YANG. 1961. Investigation on soybean diseases. Taiwan Sugar Expt. Sta. Rpt. 25: 11-25. Chinese text, English summary.

Diseases of soybeans prevalent in the sugarcane-soybean interplanted fields of Taiwan are: Alternaria sp. (brown spot); Cercospora kikuchii (purple seed stain); Fusarium oxysporum f. tracheiphilum (Fusarium pod rot); Peronospora manshurica; Sclerotium rolfsii (sclerotial blight); Leaf-crinkle virus; and Mosaic virus. Four of the five most destructive diseases in these fields are: Glomerella glycines (anthracnose) infection exceeds 60% and infected plants die when half-grown; Phakopsora sojae (rust) against which six fungicides and five combinations of fungicides were tested; Xanthomonas phaseoli var. sojense (bacterial pustule); and Rosette type virus which may cause up to 20% infection and plants may produce almost no seed.

77. CHUPP, CHARLES. 1954. A Monograph of the Fungus Genus Cercospora. 667 pp., illus. Ithaca, N. Y.

Cercospora glycines Cooke described on Glycine clandestina, with a full mycological description of the fungus, known only from the type locality, Victoria, Australia.

On Glycine max, a full mycological description is given of Cercospora cruenta Sacc., C. kikuchii Mat. & Tomoy. and C. sojina Hara.

78. (CORBETT, D. C. M.) 1963. The report of the Plant Pathologist. Nyasaland Dept. Agr., Annu. Rpt. 1961/62 (Part II): 157-159.

First report of Xanthomonas phaseoli var. sojense (Hedges) Starr & Burk. for Nyasaland.

79. CORBETT, D. C. M. 1964. A supplementary list of plant diseases in Nyasaland. Commw. Mycol. Inst., Mycol. Papers 95. 16pp.

The following collections were reported on Glycine max. From Zomba: a leafspot caused by Cercospora canescens Ell. & Mart.; a leafspot caused by Mycosphaerella phaseolorum Siemszko causing premature defoliation; and bacterial pustule caused by Xanthomonas phaseoli var. sojense (Hedges) Starr & Burk. From Lilongwe: false rust caused by Synchytrium dolichi (Cooke) Gaeum. on Glycine javanica. (p. 6)

80. COSTA, A. S. 1955. Studies on Abutilon mosaic in Brazil. Phytopath. Zeitschr. 24: 97-112. (English text.)

Inoculation of 320 soybean plants by insect vectors gave 100% infection. Natural field infections have been recorded. Affected plants are slightly reduced in size and the leaf mottling is composed of yellowish, light green, and normal green areas, with some rugosity and blistering. Pods are formed on the diseased plants. Mechanical inoculation produced no infection

81. COSTA, A. S., S. MIYASAKA, and A. J. D. PINTO. 1955. Soya bud blight, a disease caused by the Brazilian tobacco streak virus. Bragantia 14: vii-x. Portuguese text, English summary.

A virus disease closely resembling bud blight has been recorded from several areas in the state of São Paulo, Brazil. The disease has been referred to as Brazilian tobacco streak. Symptoms and control are discussed.

82. COSTA, A. S., and ANA MARIA CARVALHO. 1960. Mechanical transmission and properties of the Abutilon mosaic virus. Phytopath. Zeitschr. 37: 259-272.

For transmission tests, inoculum obtained from soybeans was generally poor even when tested on susceptible host plants.

83. COSTA, A. S., and ANA MARIA B. CARVALHO. 1961. Studies on Brazilian tobacco streak. Phytopath. Zeitschr. 42: 113-138.

Naturally infected plants (soybean) bear a close resemblance to plants infected with the American bud blight. Brazilian tobacco streak is widespread in the state of São Paulo, Brazil. (pp. 117 & 121)

84. CRALL, J. M. 1951. Soybean diseases in Iowa in 1950. Plant Dis. Rptr. 35: 320-321.

85. CRALL, J. M. 1952. Soybean diseases in Iowa in 1951. Plant Dis. Rptr. 36: 302.

86. CRALL, J. M. 1956. Observations on the occurrence of soybean stem canker. (Abs.) Phytopathology 46: 10.

87. CRALLEY, E. M., and R. L. BEECHER. 1951. The control of soybean chlorosis in rice-growing areas of Arkansas by potassium applications. (Abs.) Phytopathology 41: 7-8.

88. CRISPIN, A., and C. C. GALLEGOS. 1963. Web blight: a severe disease of beans and soybeans in Mexico. Plant Dis. Rptr. 47: 1010-1011.

Web blight (Rhizoctonia microsclerotia Matz.) caused a severe leafspot of beans and soybeans for the first time in Mexico (Vera Cruz).

89. CRITOPOULOS, P. D. 1953. A contribution on the fungus flora of Greece. Torrey Bot. Club Bull. 80: 325-341.

Two specimens of Macrophomina phaseoli (Maubl.) Ashby were collected August 10, 1940, at Botaniko, Athens. The sclerotia occur in the vessels and in the pith of the lower part of the stem. In one specimen sclerotia taken from the pith were spherical to ellipsoid 60-165 x 57-114 μ. In the other specimen sclerotia measured 36-99 x 36-81 μ. (p. 336).

90. CRITTENDEN, H. W. 1961. Disease rating of the ten most popular soybean varieties in Delaware. Del. U. Agr. Ext. C. 117, 6 p.

91. CROSS, J. E., and B. W. KENNEDY. 1964. Variability in pathogenicity in Pseudomonas glycinea. Phytopathology (Abs.) 54: 890-891.

Significant differences in pathogenicity between 10 isolates from six states. Scissors were dipped in bacterial suspension and used to snip off one cotyledon of 2-week-old seedlings, as a means of inoculation.

92. CROWLEY, N. C. 1959. Studies on the time of embryo infection by seed-transmitted viruses. Virology 8: 116-123.

When varieties Lincoln and Virginia were inoculated prior to flowering with bean southern mosaic virus, the virus was detected in almost 100% of the testa and perisperm tissues but could not be detected in the embryos when more than 100 seeds were dissected. In temperature studies, 95% embryo infection occurred in plants grown at 16-20°C, but only 55% occurred at 28-30°C. When the varieties Lincoln, Chippewa and Blackhawk were inoculated with tobacco ring spot virus, it is shown that a small proportion of embryo infection can take place in the early stages of embryo development.

93. CUMMINS, G. B. 1950. Uredinales of Continental China collected by S. Y. Cheo. I. Mycologia 42: 779-797.

Phakopsora pachyrhizae Syd. collected at Anhwei in 1932, in Kiangsi in 1932, and at Kweichow in 1931 (p. 784).

94. CUTURILO, S. 1952. Insect pests and plant diseases in the territory of the People's Republic of Serbia in 1951. Zashtita Bilja 11: 21-42. Croatian text, English summary.

Occurrence of Peronospora manshurica reported in Yugoslavia. (p. 32)

95. da COSTA, G. C., and B. B. MUNDKUR. 1948. A revision of the genus Phyllosticta in India. Natl. Inst. Sci. India, Proc. 14: 55-63.

Phyllosticta glycines Thuemen. collected on leaves in Kashmir, 1908. (p. 59)

96. da COSTA NETO, J. P. 1943. (Fungi of the Rio Grande do Sul (Brazil) observed during the years 1940-41.) Rio Grande do Sul (State) Sec. de Estados dos Negoc. da Agr., Indus. e Com., Bol. 99. Portuguese text.

States that a specimen of Sclerotium bataticola was collected near the city of Bage in 1941. (p. 5)

97. DALE, W. T. 1949. Observations on a virus disease of cowpea in Trinidad. Ann. Appl. Biol. 36: 327-333.

Mosaic symptoms occasionally occur on soybeans but only when they are growing near to infected cowpeas. Symptoms are described.

98. DANKO, J. 1962. (The Peronospora of soybean - Peronospora manshurica (Naumoff) Syd. - in Slovakia.) Ceska Mykol. 16: 119-122. Czech text. Short German summary.

The first record for Slovakia (A territory in Czechoslovakia.)

99. DEBROT, E. A. 1964. Studies on a strain of raspberry ringspot virus occurring in England. Ann. Appl. Biol. 54: 183-191.

Mechanically transmitted to soybeans, varieties Mandarin, Blackhawk, Pennsoy, and Lincoln.

100. de CARVALHO, T., and O. MENDES. 1958. (Diseases of plants in Mozambique.) 84 pp. Lourenco Marques. Portuguese text.

Bacterial spot (Pseudomonas glycinea) has been noted in the Umbeluzi area. It attacks the cotyledons of seedling plants, but commonly manifests itself when the plants are half grown and progresses until they reach maturity. Wilt due to Sclerotium rolfsii Sacc. also reported from Umbeluzi. (p. 64).

101. DEIGHTON, F. C., and T. W. TINSLEY. 1958. Notes on some plant virus diseases in Ghana and Sierra Leone. West African Sci. Assoc. Jour. 4: 4-8.

A mosaic probably due to soybean mosaic virus carried in the seed. (p.6).

102. DEL PRADO, F. A., and N. J. VAN SUCHTELEN. 1955. (List of Diseases of Agricultural and Horticultural Crops in Surinam.) 25 pp. Dutch text.

Sclerotium rolfsii produces white ray-forming mycelium on the foot of the stem and on the ground. Yellow-brown sclerotia form later. A virus, probably carried by insects, is reported to cause stunting and crinkly leaves. (p. 8).

103. DISTRIBUTION MAPS OF PLANT DISEASES (various dates) Commonwealth Mycological Institute, England. (424 maps as of 1966).

Shows world wide distribution of the pathogen. Some of the causal agents listed for soybeans are: Diaporthe phaseolorum var. caulivora, Nematospora coryli, Peronospora manshurica, Septoria glycines, soybean mosaic virus, etc.

104. DEUTSCHMANN, F. 1953. (On the 'purple stain' disease of the soybean and the pigment formation by its agent, Cercosporina kikuchii). Phytopath. Zeitschr., 20: 297-310. German text.

Seeds of a soybean strain imported from America showed a red-violet discoloration resulting from attack by C. kikuchii, previously known only in East Asia and America. The fungus is localized in the seed coat until germination begins, then infects the seedling tissues. In culture, the fungus produces the same red-violet pigment that it does in seed coats. Pigment formation depends on an acid reaction of the substrate and the presence of light and oxygen. Pigment deposits, in part crystalline, may be observed on the fungal hyphae of young cultures. The pigment, crystallized from an alcoholic extract of mycelium, had a melting point between 208 and 210°C. (Taken from Biol. Absts. 29 #27108. 1955).

104A. DO AMARAL, J. F. 1951. (Principal diseases of cultivated plants in the state of Sao Paulo and their control.) Biologico [Brazil] 17:179-188. Portuguese text.

Suggested control in Sao Paulo, Brazil of: Cercospora sp. is to plant early varieties; of Diaporthe sojae is to use certified seed, rotate crops, and destroy crop residue. (p. 187).

105. DOIDGE, E. M. 1924. A preliminary check list of plant diseases occurring in South Africa. So. Africa Bot. Survey, Mem. 6. 56pp.

Downy mildew (Peronospora manshurica), leaf blight (Alternaria sp.), and leaf spot (Phoma sp.) were observed in Natal in 1923. (p. 12).

106. DOIDGE, E. M., A. M. BOTTOMLEY, J. E. van der PLANK, and G. D. PAUER. 1953. A revised list of plant diseases in South Africa. So. Africa Dept. Agr., Sci. Bull. 346. 122 pp.

The following are reported from various areas: Alectra vogelii (a root parasite), Alternaria sp. (leaf blight), Colletotrichum glycines (anthracnose on stems), Phoma sp. (leaf spot), Pseudomonas glycinea (bacterial blight), Sclerotium rolfsii (wilt), and soybean mosaic. (pp. 89-90).

107. DUMBLETON, L. J. 1954. A list of plant diseases recorded in South Pacific Territories. South Pacific Comm. Tech. Paper No. 78. 76pp.

Records the occurrence of Sclerotium sp. at Fiji. (p. 47).

108. DUNIN, M. S. 1959. On some methods of obtaining and applying antisera in phytopathological and entomological researches. Internatl. Congr. of Crop Protect. 4th, Proc. 1:259-266.

A discussion of work done in the USSR at various institutions, including the influence of method of preparing antigens from Xanthomonas phaseoli var. sojense and cytotoxic serum upon the titre and avidity of the obtained sera and use of the serological method in determining the resistance of soybean varieties to cotyledon bacteriosis.

109. DUNLEAVY, J. 1954. Soybean diseases in Iowa in 1953. Plant Dis. Rptr. 38:89-90.

110. DUNLEAVY, J. 1955. Soybean diseases in Iowa in 1954. Plant Dis. Rptr. 39: 169-170.

111. DUNLEAVY, J. M. 1955. Susceptibility of soybean petioles to attack by Diaporthe phaseolorum var. caulivora. Iowa Acad. Sci. Proc. 62:104-108.

On basis of artificial inoculation by toothpick tips, it was concluded that infected petioles are unlikely to be an important source of stem canker

112. DUNLEAVY, J. M. 1956. Soybean diseases in Iowa in 1955. Soybean Digest 16(9):20.

113. DUNLEAVY, J. M. 1956. A method for determining stem canker resistance in soybean. Iowa Acad. Sci.,Proc. 63:274-279.

Inoculation of the stem tip with toothpick tips containing Diaporthe phaseolorum var. caulivora of the resistant Harosoy, strain A6K-1040 and the susceptible Hawkeye showed that growth rate was greatest in Hawkeye, less in A6K-1040, and intermediate in Harosoy. It was concluded that stem canker resistance in soybeans was directly proportional to the growth rate of the pathogen in the stem.

Growth of the fungus was retarded at the nodes, but growth was resumed once the node was penetrated. This should be taken into account when comparing fungus growth rates in varieties with widely different internode lengths.

114. DUNLEAVY, J. M. 1957. Infected roots as a source of stem canker of soybean. (Abs.) Phytopathology 47:8.

115. DUNLEAVY, J. M. 1957. A previously undescribed virus disease of soybeans. (Abs.) Phytopathology 47:519.

A disease similar in symptoms to bud blight (TRS) but shown to be different from TRS by host range and cross-protection tests. Occurs also on Setaria viridis and on Melilotus alba. The host range differed from that of cucumber mosaic virus only on certain Leguminosae. Symptoms additional to those of bud blight are necrosis of pod sutures and subsequent splitting of pods along the sutures and angular necrotic areas on the pods falling out as the pods grow larger. The virus is seed-borne. Greenhouse symptoms on soybean were indistinguishable from those of tobacco ringspot.

116. DUNLEAVY, J. M. 1957. The grasshopper as a vector of tobacco ringspot virus in soybean. Phytopathology 47:681-682.

Melanoplus differentialis. Percentage of transmission was low, and the grasshopper was not considered an efficient vector.

117. DUNLEAVY, J. M. 1957. Variation in pathogenicity of Diaporthe phaseolorum var. sojae to soybean. Iowa St. Coll., Jour. Sci. 32:105-109.

A strain of D. phaseolorum var. sojae isolated from pycnidia on a dead petiole at the base of a living stem, and another from a light brown stem lesion (1 x 0.25 in., and lacking the usual dark margin) on an actively growing stem were compared by the toothpick method for pathogenicity to 60- and 80-day plants of Hawkeye and 100-day plants of Lincoln. A highly pathogenic isolate of D. phaseolorum var. caulivora served for comparison. On all plants the first isolate was more pathogenic than the second, but less so than var. caulivora. During a drought in August and September, field-grown plants were killed by var. sojae.

118. DUNLEAVY, J. M. 1958. Studies of seedling blight of soybeans and the etiology of the causal fungus Diaporthe phaseolorum var. caulivora. Iowa Acad. Sci., Proc. 65:131-145.

119. DUNLEAVY, J. M. 1959. X-ray irradiation of soybean seed as a technique for production of disease-resistant plants. Iowa Acad. Sci., Proc. 66:113-122.

Resistance to bacterial blight and stem canker was evident in the first generation after seed irradiation. Progeny from resistant plants became more susceptible in each successive generation.

120. DUNLEAVY, J. M. 1959. Survey of races of Peronospora manshurica in the United States. (Abs.) Phytopathology 49:537-538.

121. DUNLEAVY, J. M., C. R. WEBER, and D. W. CHAMBERLAIN. 1960. A source of bacterial blight resistance for soybeans. Iowa Acad. Sci., Proc. 67:120-125.

A plant introduction P.I. 68708, was resistant to Pseudomonas glycinea.

122. DUNLEAVY, J. M. 1961. Recent progress in soybean disease research. Soybean Digest 21(9):10-12.

123. DUNLEAVY, J. M. 1962. Pigmentation of soybean seed coats associated with bacteria. Phytopathology (Abs.) 52:730.

124. DUNLEAVY, J. M. 1962. Stunt disease of soybeans caused by Corynebacterium sp. Phytopathology (Abs.) 52:8.

125. DUNLEAVY, J. M., and J. F. KUNKEL. 1962. Increased bacterial populations in soybean roots due to phosphorus. Phytopathology (Abs.) 52:730.

High populations of an unidentified Corynebacterium sp. were found in roots of certain soybean varieties grown in a high PO_4 (100 ppm P) nutrient solution. Roots of Lincoln plants grown in high PO_4 solution had bacterial populations over 100 times greater than in roots of Blackhawk grown in the same solution or in roots of both varieties grown at low (5 ppm P) phosphorus levels.

126. DUNLEAVY, J. M. 1962. Fusarium blight of soybeans. Iowa Acad. Sci., Proc. 68:106-113.

F. orthoceras isolated from soybean produced necrosis of succulent root tissues of seedlings and infection of lateral root tips of older plants. Pods and seed were most susceptible after maturity, high R. H. being needed for seed infection. In the field, maximum yield and stand losses occurred when seeds were sown in contaminated soil before rain. In the greenhouse maximum losses were at 100% soil moisture and 21°C. and were less at 27°. Seedlings grown at 100% and 21° for 3 weeks wilted for good in a few hours when temperature was raised to 33°, but only in contaminated soil.

127. DUNLEAVY, J. M. 1963. A vascular disease of soybeans caused by Corynebacterium sp. Plant Dis. Rptr. 47:612-613.

The first symptom on seedlings is a wilting during the warmest part of the day. A marginal necrosis develops on the lower leaves, followed by death of the leaves. On older plants after the flowering stage, small chlorotic spots develop on the leaves under drought or other stress. Leaves do not wilt. Pods are abnormally formed or unfilled

128. DUNLEAVY, J. M. 1964. A new bacterial disease of soybeans. Phytopathology (Abs.) 54:891.

The first symptom is a translucence of the infected areas of the leaf. Narrow halos of chlorotic tissue develop at the lesion margins and dead tissue becomes a dark brown. "Chocolate spot" suggested as the common name. The bacterium causing the disease is gram negative, does not produce fluorescent or yellow pigment in culture, gives a positive test for starch hydrolysis, gelatin liquefaction, nitrate reduction, and catalase and ammonia production. Symptoms similar to those of brown spot caused by Septoria glycines.

129. DYSART, R. J., and D. W. CHAMBERLAIN. 1960. Studies on transmission of tobacco ringspot virus on soybean and weed suscepts. Plant Dis. Rptr. 44:952-954.

Negative results in attempts to transmit TRSV from infected to healthy plants with whiteflies, flea beetles, bean leaf beetle, spotted cucumber beetle, spider mites, and aphids. Abutilon theophrasti and Polygonum hydropiperoides were susceptible when inoculated mechanically.

130. ELLIS, M. B. 1957. Some species of Corynespora. Commonwealth Mycol. Inst., Mycol. Papers 65. 15 pp.

Corynespora cassiicola (Berk. & Curt.) Wei on leaves and stems of Glycine max. (pp. 12-13).

131. (ENDO, SHIGERU) 1963. (Protecting Food Crops from Diseases.) 693 pp. Tokyo (Japanese text).

Taxonomic notes and suggestions for control of: Ascochyta sojaecola (p. 503); Cercospora sojina, frogeye (p. 495); Cercospora kikuchii, purple stain (p. 506); Corticium rolfsii, sclerotial blight (p. 505); Corynespora sp. (p. 515); Cuscuta sojagena (p. 521); Diaporthe phaseolorum var. sojae, pod and stem blight (p. 499); Elsinoe glycines, Sphaceloma scab (p. 509); Fusarium oxysporum f. tracheiphilum, blight and pod rot (p. 498); Glomerella glycines, anthracnose (p. 497); Macrophoma mame (p. 513); Macrophomina phaseoli, charcoal rot (p. 511); Mycospharella sojae, brown leaf spot (p. 501); Ophionectria sojae, basal stem rot (p. 500); Pellicularia sasakii (p. 504); Peronospora manshurica, downy mildew (p. 494); Phakopsora pachyrhizi, rust (p. 496); Pleosphaerulina americana (p. 505); Pseudomonas glycinea var. japonica, bacterial blight (p. 516); Sclerotinia sclerotiorum, Sclerotinia rot (p. 506); Septogloeum sojae (p. 508); Septoria glycines, brown spot (p. 504); Xanthomonas phaseoli var. sojensis, bacterial pustule (p. 515); and mosaic (p. 517).

132. ERDMAN, L. W., H. W. JOHNSON, and FRANCIS CLARK. 1956. A bacterial-induced chlorosis in the Lee soybean. Plant Dis. Rptr. 40:646.

Upper leaf chlorosis on Lee variety soybeans during the pre-bloom stage. The numbers of chlorotic plants varied from negligible to 10% at any one time. Many of the plants recovered spontaneously.

This trouble was found to be associated with certain rhizobial inoculants, while with other inoculants the trouble never appeared.

133. FARR, MARIE L., and J. A. STEVENSON. 1964. (A supplementary list of Bolivian fungi.) Sydowia 17:37-69. German text.

Xanthomonas phaseoli Dows. on leaves collected at Santa Cruz. Feb. 2, 1953. (p. 57)

134. FEASTER, C. V. 1952. Bacterial pustule disease in soybeans: artificial inoculation, varietal resistance, and inheritance of resistance. Mo. Agr. Expt. Sta., Res. B.487. 26 pp.

Xanthomonas phaseoli var. sojensis, the causal organism.

135. FRANDSEN, N. O. 1953. (Ascochyta sojaecola on soybean in Germany). Phytopath. Zeitschr. 20:375-382. German text, English summary.

First report from Europe for this disease on Glycine max, found in Lower Saxony and Baden in 1951 and 1952. Seedlings and foliage, stems, and pods of mature plants were attacked. The paper includes photographs of symptoms on cotyledons, leaves, stems, and pods. Pycnidia, conidia, and cultures are shown.

136. FREIRE, J. R. JARDIM. 1953. (Bacterial pustule of soybean). Rev. Agron. (Porto Alegre, Brazil) 16:88-91. Portuguese text.

[Probably the first report of bacterial pustule from Brazil]. Symptoms, isolation of the pathogen, inoculation, and control are discussed.

137. FRENCH, E. R. 1963. Effect of soil temperature and moisture on the development of Fusarium root rot of soybean. Phytopathology 53:875.

When grown in nearly saturated soil infested with F. oxysporum, soybean roots remained healthy at 32, 29, and 26° C., but rot symptoms appeared at 23, 20, 17, and 14°C., becoming more severe with the fall in temperature. Since the pathogen in culture grew more rapidly at 27° than at lower temperatures, it was concluded that the increase in disease at lower temperatures is due to a reduction in host resistance by unfavorable growing conditions.

138. FROSHEISER, F. I., and M. F. KERNKAMP. 1954. Asexual spore production in Diaporthe phaseolorum var. batatatis. (Abs.) Phytopathology 44:489.

139. FROSHEISER, F. I. 1955. Studies on the etiology and epidemiology of Diaporthe phaseolorum var. caulivora, the cause of stem canker of soybean. Diss. Abstr. 15: 1286-1287.

140. FUJIKAWA, T. 1951. On "Shirakium disease" (stem rot) of soybean. Japanese Jour. Plant Protect. 5(21): 42-44. (Japanese text).

141. FUJIOKA, Y. 1952. List of crop diseases in Japan. Gen HQ. Supreme Commander Allied Powers, Tokyo, Japan, Econ. & Sci. Sec. Nat. Resources Div., Prelim. Study No. 73. 212 pp.

Reports the occurrence of the following on soybean: Ascochyta sp., Cercospora kikuchii, C. sojina, Corticium centrifugum (Lev.) Bres., pod and stem blight (Diaporthe sojae Lehman), Glomerella glycines, pod rot caused by Fusarium bulbigenum var. tracheiphilum, Macrophoma mame Hara, Mycosphaerella sojae Hori, a basal stem rot caused by Ophionectria sojae, downy mildew (Peronospora manshurica), rust (Phakopsora pachyrhizi), bacterial blight (Pseudomonas glycinea var. japonicum), Sclerotinia sclerotiorum, bacterial pustule (Xanthomonas phaseoli var. sojense) and soybean mosaic virus. (pp. 137-139).

142. FUJISE, S., S. HISHIDA, M. SHIBATA, AND M. MATSUEDA. 1961. Structure of fusaroskyrin a pigment of Fusarium species: a pathogen of the soybean purple speck disease. Chem. & Indus. 43: 1754-1755.

143. FUKUSHI, T. 1932. A contribution to our knowledge of virus diseases of plants in Japan. Sapporo Nat. Hist. Soc., Trans. 12: 130-141.

English text. Mosaic was observed by the author at Sapporo in 1929. Most of the article is on the history of virus studies in general.

144. FULTON, J. M., C. G. MORTIMORE, and A. A. HILDEBRAND. 1961. Note on the relation of soil bulk density to the incidence of Phytophthora megasperma var. sojae root and stalk rot of soybeans. Canad. J. Soil Sci. 41(2): 247.

145. GALVEZ, G. E. 1963. Host-range, purification, and electron microscopy of soybean mosaic virus. Phytopathology 53: 388-393.

146. GANTE, T. 1954. (Verticilliosis of soybeans.) Nachrichtenbl. des Deut. Pflanzenschutzd. (Braunschw.) 6:38. German text.

At Ladenburg on the Neckar, Germany, soybeans developed a tracheomycosis which spread extensively with the onset of a wet spell following a protracted drought in the summer of 1952. Verticillium albo-atrum was isolated from the bases of infected stems. Apparently this is the first report on soybeans for Germany. The fungus was also present in stunted lupins in another part of the same field. (From abst. in Rev. Appl. Mycol. 33: 518. 1954)

146A. GARBOWSKI, L., and H. JURASZKOWNA 1933. (Diseases of useful plants in the period of 1926/1930. A summary of reports of the plant protection stations.) Rocznik Ochrony Roslin Sect. A, 1: 97-235. Polish text.

A briefly annotated list that reports the (first ?) occurrence of Sclerotinia sclerotiorum, 1929, Ascochyta sp., 1930, bacteriosis, 1930, and mosaic, 1930 on soybean in Poland.

147. GERDEMANN, J. W. 1954. The association of Diaporthe phaseolorum var. sojae with root and basal stem rot of soybean. Plant Dis. Rptr. 38: 742-743.

148. GOODCHILD, D. J. 1956. Relationships of legume viruses in Australia. I. Strains of bean yellow mosaic virus and pea mosaic virus. II. Serological relationships of bean yellow mosaic virus and pea mosaic virus. Australian Jour. Biol. Sci. 9: 213-230 & 231-237.

Soybeans were susceptible by inoculation to BYMV but not to 2 Australian strains of PMV. Cross-agglutination experiments showed the strains of PMV and BYMV to be serologically related and cross-protection tests support the hypothesis that these are strains of the same virus. (pp. 220, etc.)

149. GORDON, W. L. 1956. The taxonomy and habitats of the Fusarium species of Trinidad, B.W.I. Canadian Jour. Bot. (Abs.) 34: 847-864.

Fusarium semitectum Berk. & Rav. isolated from discolored basal parts of a plant. Lists as synonymous F. semitectum var. majus Wr., F. diversisporum Sherb., and F. roseum Lk. emend. Snyd. & Hansen pr. p. (pp. 854, etc.)

150. GORLENKO, M. V. 1947. A survey of the geographical distribution of bacterial plant diseases in the USSR. Moscow Obshch. Isp. Prirody, Biull. Sect. Biol. 52(2): 61-70. (Russian text, English summary.)

The bacteria are divided into groups according to their frequency in the USSR. Bacterium glycineum Coerper and B. phaseoli sojensis Hedges are discussed. (pp. 63 & 65)

151. GRABE, D. F., and J. DUNLEAVY. 1959. Physiologic specialization in Peronospora manshurica. Phytopathology 49: 791-793.

Races 7 and 8 delineated.

152. GRAHAM, J. H. 1952. New wildfire symptoms on soybean. Plant Dis. Rptr. 36: 22.

Reports the isolation of Pseudomonas tabaci from discolored pods, stems and petioles of soybean plants severely infected with wildfire. Irregularly shaped brown lesions on the stems, and brownish spots and streaks were found on the petioles, petiolules, and pulvini. On the pods, the infected areas were dark brown and somewhat watersoaked with occasional lighter brown necrotic streaks near the margins.

Also reports the finding of lesions without the chlorotic zone, believed to be caused by the wildfire organism. Presumes that such lesions are formed when water congested tissue surrounds the point of infection, and that the cells in this area are killed so rapidly by the invading bacteria that no chlorosis results.

153. GRAHAM, J. H. 1952. Preservation of three bacterial pathogens of soybean in culture. Plant Dis. Rptr. 36: 22-23.

Reports that Pseudomonas tabaci and Ps. glycinea remained viable and highly pathogenic after storage in beef-peptone broth (no dextrose) at 4-8°C. for 31 months, provided that the mouths of the tubes were covered with tin foil.

Ps. glycinea, Ps. tabaci, and Xanthomonas phaseoli var. sojensis remained alive and pathogenic for 29 months on beef dextrose agar slants covered with sterile mineral oil. The cultures were allowed to grow for one day before being covered with oil.

154. GRAHAM, J. H. 1953. Overwintering of three bacterial pathogens of soybean. Phytopathology 43: 189-192.

155. GRAHAM, J. H. 1953. Cultural and epiphytotic relationships of three bacterial pathogens of soybeans. Phytopathology 43: 193-194.

Pseudomonas tabaci, Pseudomonas glycinea, and Xanthomonas phaseoli var. sojensis.

156. GRASSO V. 1962. (Regeneration of sclerotia of Sclerotinia sclerotiorum (Lib.) de Bary.). Staz. di Patol. Veg. (Rome), Boll. Ser. III, 19: 95-101. Italian text. English summary.

In an attempt to induce germination, large sclerotia which were contaminated by bacteria were cut into pieces a few mm. thick and transferred to triangular pieces of fresh potato dextrose agar, though this did not entirely eliminate the bacteria. The parts laid bare by the cuts thereon developed new pseudoparenchymata and formed one or two small sclerotia. When the process was complete, mycelium grew rapidly over the medium and gave rise to numerous sclerotia on the periphery. Sclerotia from another locality and grown in cultures without bacterial contamination failed to regenerate. (Taken from an abst. in Rev. Appl. Mycol. 42: 97, 1963.)

157. GRUJICIC, G. and B. TOMASEVIC. 1956. Diseases and pests of cultural plants observed in the period of twenty years (1934-1953). Zashtita Bilja 38: 87-106. Croatian text, short English summary.

The Information Service for Plant Protection in Yugoslavia reported that Bacterium phaseoli E. F. Smith was found at Rumi and Leskovc in 1934, at Belgrade and Sapcu in 1941, and at Krusevc in 1946, and B. glycineum was found in Belgrade in 1940.

158. GUSTAVSSON, A. 1959. Studies on Nordic Peronosporas. I. Taxonomic revision. Opera Bot. 3(1): 1-271.

The known distribution of Peronospora manshurica is Sweden, Denmark, Great Britain, Rumania, Russia, Yugoslavia, South Africa, China, India, Japan, Philippines, Bermuda, Canada, and U.S.A. (pp. 155-156)

159. HAAS, J. H. 1964. Isolation of Phytophthora megasperma var. sojae in soil dilution plates. Phytopathology (Abs.) 54: 894.

The pathogen was selectively isolated from soil on Difco cornmeal agar containing pimaricin (2 ppm), penicillin G (80 units per ml), polymixin B (370 units/ml), and quintozene (10 ppm), adjusted to pH 4.6 with lactic acid. The concentration of pimaricin is critical. Successful isolations were made from soybean rhizospheres and from soil in which infected soybeans were growing.

160. HAMILTON, R. I., and M. G. BOOSALIS. 1955. Asexual reproduction in Cephalosporium gregatum. Phytopathology 45: 293-294.

Report a budding type of conidial germination. Sporulating and non-sporulating strains were isolated after the organism had grown in shake culture. Temperatures between 14.5° and 21.0°C. promoted sporulation; no fruiting was recorded at temperatures above 29.0°C. pH 5.0 to 6.0 favored sporulation in the sporulating type but did not influence the non-sporulating type. Soybean stem agar induced sporulation in the non-sporulating type. Budding took place only on water agar.

161. HAN, Y. S. 1959. Soybean diseases in Taiwan. Agr. Assoc. China (Taiwan), Jour. New Ser. 26: 31-38. Chinese text, English summary.

150 soybean varieties were examined over a two year period in most of the soybean producing areas of the island. Bacterial blight (Pseudomonas glycinea) and bacterial pustule (Xanthomonas phaseoli var. sojense) were the most widespread diseases. Purple seed stain (Cercospora kikuchii) is one of the most destructive diseases in central Taiwan. Fusarium pod rot (F. oxysporum f. tracheiphilum) is increasing in importance. Other diseases covered include frogeye (Cercospora sojina), downy mildew (Peronospora manshurica), sclerotium blight (Corticium centrifugum), rust (Phakopsora sojae), anthracnose (Glomerella glycines), Sclerotinia rot (Sclerotinia sclerotiorum), seed rot (Fusarium scirpi f. tracheiphilum?), brown spot (Alternaria sp. and Helminthosporium sp.) violet rot (Helicobasidium mompa), and pod blight (Macrophoma mame).

161A. HANLIN, R. T. 1963. A revision of the Ascomycetes of Georgia. Georgia Agr. Expt. Stas., Mimeo. Ser. N.S. 175. 67 pp.

Records on soybeans: Diaporthe phaseolorum var. sojae (Lehm.) Wehm.; Glomerella glycines Lehm. & Wolf; and Mycosphaerella cruenta Latham.(p. 39)

162. Hansford, C. G. 1943. Host list of the parasitic fungi of Uganda. Part II. East African Agr. Jour. 9: 50-55.

Lists the occurrence of the following organisms on Glycine spp.: Aphysa rhynchosiae (Kalch. & Cooke) Theiss. & Syd.; Cercospora cruenta Sacc.; Meliola bicornis Wint.; Rhizoctonia bataticola (Taub.) Butl.; and Woroninella dolchi (Cooke) Syd.

163. HARNISH, W. N., and W. G. MERZ. 1963. The effect of beta-sitosterol on oospore production by species of Phytophthora. (Abs.) Phytopathology 54: 747.

The addition of B-sitosterol to a glucose-asparagine agar medium induced oospore formation in P. megasperma var. sojae, P. cactorum, and others.

164. HARTWIG, E. E., and S. G. LEHMAN. 1951. Inheritance of resistance to the bacterial pustule disease (Xanthomonas phaseoli sojensis) in soybeans. Agron. J. 43: 226-229.

Findings indicate that resistance is recessive and governed by a single gene pair.

165. HARTWIG, E. E., and H. W. JOHNSON. 1953. Effect of bacterial pustule disease (X. phaseoli sojensis) on yield and chemical composition of soybeans. Agron. J. 45: 22-23.

166. HARTWIG, E. E. 1959. Effect of target spot on yield of soybeans. Plant Dis. Rptr. 43: 504-505.

Differences in yield between 3 susceptible and 3 resistant lines of soybeans under moderately heavy target spot development were highly significantly different. With light infection, the differences were non-significant.

In defoliation experiments, removal of all leaves 21 days prior to normal maturity resulted in a yield reduction of 29%, and a 17% reduction when the leaves were removed 14 days prior to normal maturity. The yield reduction from target spot seems to approximate the yield reduction to be expected from the defoliation which it causes.

167. HARTWIG, E. E. 1960. Soybean varieties, diseases, and practices in the Midsouth. Soybean Digest 20(6)): 16-17.

168. HATTINGH, I. D. 1954. Control of witchweed. Farming So. Africa 29: 316-318.

According to experiments conducted by P. J. Botha of the Potchefstroom University, South Africa, the roots of 9 non-gramineous crops, including soybeans, secrete the substance capable of germinating witchweed seed (Striga lutea) but are not themselves attacked by the parasite.

169. HAWN, E. J., and T. C. VANDERPOOL. 1953. Preliminary studies on the sexual stage of Rhizoctonia solani Kuhn. Canad. J. Bot. 31: 699-710.

170. HENNINGS, P. 1903. (Some new Japanese Uredinales IV.) Hedwigia 42 (Supplement): 107-108. German text.

Uredo sojae Henn. collected on leaves in the province of Tosca, Sept., 1902, and described as a new species with Latin description.

171. HERR, L. J. 1957. Nutritional studies of an isolate of Phytophthora cactorum inciting a root rot of soybeans in Ohio. Phytopathology 47: 16.

This fungus, like most species of Phytophthora, required thiamin for growth. The nitrogen requirements of the fungus differed depending on whether sucrose or cellulose was used as the carbon source. When sucrose was used, the best chemically defined sources of nitrogen were potassium nitrate and L-asparagine. There was no significant difference in growth of the fungus on sucrose when supplied with these two nitrogen sources. With purified cellulose as the carbon source, growth occurred only when organic nitrogen compounds were used as the nitrogen sources. Of 10 nitrogen-containing compounds (amino acids and amides), L-asparagine and L-aspartic acid supported the best growth of the fungus.

172. HERR, L. J. 1957. Factors affecting a root rot of soybeans incited by Phytophthora cactorum. (Abs.) Phytopathology 47: 15.

Young plants 1-3 weeks old were more susceptible than were older plants. The rate at which plants were killed decreased progressively in older groups of plants. Disease incidence decreased with decreasing concentrations of inoculum. The method of adding inoculum to the soil and the location of the inoculum with respect to the plant greatly influenced disease development. Pathogen-free filtrates of culture solutions were not toxic to soybeans.

173. HILDEBRAND, A. A., and L. W. KOCH. 1951. A study of systemic infection by downy mildew (Peronospora manshurica) of soybean with special reference to symptomatology, economic significance and control. Sci. Agr. 31: 505-518.

174. HILDEBRAND, A. A., and L. W. KOCH. 1952. Observations on a root and stem rot of soybeans new to Ontario, caused by Pythium ultimum Trow. Sci. Agr. 32: 574-580.

This is the first report of P. ultimum as being pathogenic to soybeans. Found in early July 1951 affecting a number of varieties almost simultaneously in Essex and Kent counties in southwestern Ontario.

175. HILDEBRAND, A. A. 1952. Stem canker; a disease of increasing importance on soybeans in Ontario. Soybean Digest 12(9): 12-15.

176. HILDEBRAND, A. A. 1953. Some aspects of soybean diseases in Ontario. Soybean Digest 13(9): 18-20.

177. HILDEBRAND, A. A. 1953. Diseases of soybeans in southwestern Ontario in 1952. Canad. Sci. Serv. Div. Bot. & Plant Path., Annu. Rpt. 32: 35-37.

177A. HILDEBRAND, A. A. 1953. An elaboration of the toothpick method of inoculating plants. Canad. Jour. Agr. Sci. 33: 506-507.

With this improved method up to 400 inoculations per day were completed on soybeans in the field. Diaporthe phaseolorum var. sojae and stem canker (D. phaseolorum var. caulivora) were used as test organisms.

178. HILDEBRAND, A. A. 1954. Observations on the occurrence of the stem canker and pod and stem blight fungi on mature stems of soybean. Plant Dis. Rptr. 38: 640-646.

179. HILDEBRAND, A. A., and H. R. BOYCE. 1955. An occurrence of mealybugs (Psudococcus maritimus) and of Botrytis on soybeans in Ontario. Plant Dis. Rptr. 39: 171-173.

180. HILDEBRAND, A. A. 1956. Observations on stem canker and pod and stem blight of soybeans in Ontario. Canad. J. Bot. 34: 577-599.

Stem canker (Diaporthe phaseolorum var. caulivora) is the most serious soybean disease in this area. Inoculation experiments on susceptible varieties showed the plants became less susceptible as they matured. Pod and stem blight (D. phaseolorum var. sojae) is of negligible importance. The pathogen, which is observed mostly in the imperfect (Phomopsis) stage, shows little evidence of being able to infect plants until late in the growing season.

181. HILDEBRAND, A. A. 1957. A Phytophthora root and stalk rot of soybeans. Abs., in Proc. Canad. Phytopath. Soc. 25: 14-15.

Tentatively identified as P. megasperma. (See R.A.M. 36: 373) Outbreak coincided with the widespread planting of the highly susceptible Harosoy variety. Other varieties, including Monroe, remained virtually unaffected. Grows at temperature range of 7.5 to 32.5°C. (Optimum 25°C.). In experimental inoculations certain varieties of snap beans and dry beans (Phaseolus vulgaris) and also Lima beans (P. lunatus) are susceptible. Adapted from abst. in Rev. Appl. Mycol. 37: 437. 1958.

182. HILDEBRAND, A. A., 1959. A root and stalk rot of soybeans caused by Phytophthora megasperma Drechsler var. sojae var. nov. Canad. J. Bot. 37: 927-957.

Has been quite destructive since 1954 in southwestern Ontario. It is proposed that this new variety take the place of P. cactorum (Lib. & Cohn) Schroet. and P. sojae Kaufmann & Gerdemann. A Pythium sp., encountered in the same area in 1958, seemed to affect soybeans differently from P. ultimum Trow (Hildebrand & Koch 1952). It produced stem lesions but left the roots virtually intact. Was also destructive to wax beans.

183. HILDEBRAND, A. A. 1960. Root and stalk rot of soybeans in southwestern Ontario. Forage Notes (Ottawa) 6(2): 7-10.

184. HILTY, J. W., and A. F. SCHMITTHENNER. 1962. Pathogenic and cultural variability of single zoospore isolates of Phytophthora megasperma var. sojae. Phytopathology 52: 859-862.

185. HINO, I. 1933. List of plants susceptible to mosaic and mosaic-like diseases. Miyazaki Col. Agr. & Forestry, Bull. 5: 97-111. English text.

Soybean mosaic is common in Miyazaki, Japan. (p. 104)

186. HIRAI, T. 1956. The diagnosis of plant virus diseases by means of the paper electrophoresis. Kyoto Univ. Inst. Pl. Dis., Forsch. auf dem Geb. der Pflanzenkrank. 6: 87-96. Japanese text, English summary.

Seven viruses, including soybean mosaic, from 6 plant species were used in an experiment to compare the electrophoretic run between healthy and virus-infected plants. Conclusions were: (1) Virus-infected proteins move less than healthy proteins on a filter paper. (2) Frequently the healthy proteins move toward the cathode, although the virus-infected proteins move toward the anode. (3) Electrophoretic patterns of the virus-infected proteins differ from those of the healthy proteins.

187. HIRATA, K. 1955. Comparison of powdery mildews and their host plants of Japan and the United States of America. Niigata Univ. Fac. Agr., Bull. (Japan) 30 (5): 146-152. Japanese text, English summary.

Erysiphe polygoni does not occur on soybean in Japan but does in the U.S.A.

188. HIRATA, K. 1956. The powdery mildews parasitic on Leguminosae. Niigata Univ. (Japan) Fac. Agr., Bull. 1956(8): 110-122. Japanese text. English summary.

Two Erysiphe species, one Microsphaera and one Sphaerotheca have been reported on one or more of three species of Glycine (specific names not designated). (p. 116) In a review of the literature (185 citations) it was found that 406 out of 12,000 species and varieties of Leguminosae are hosts of powdery mildews. This ratio (about 3.3%) is low when compared with the number of host plants in other families.

189. HIRATSUKA, N., and T. YOSHINAGA. 1935. Uredinales of Shikoku (Japan). (Contributions to the rust-flora of Eastern Asia - II.) Tottori (Japan) Agr. Coll., Mem. 3: 249-377. English text.

Phakopsora pachyrhizi Syd. (Syns; Uredo sojae Henn. and Phakopsora sojae Benth.) collected on Glycine soja in Tosa and Iyo Provinces. On G. ussuriensis in Tosa Province.

190. HIRATSUKA, N. 1936. Uredinales collected in Kiushu (Japan). III. Jour. Japan. Bot. 12: 265-272. English text.

Collected Phakopsora pachyrhizi Syd. on Glycine max and G. ussuriensis in the Province of Chikugo, 1935. (p. 270)

191. HIRATSUKA, N. 1941. Materials for rust-flora of Manchoukuo, I. Sapporo Nat. Hist. Soc., Trans. 16: 193-208.

Collected Phakopsora pachyrhizi Syd. in the Province of Kitsurin, (Manchuria) September, 1934. (p. 195)

192. HIRATSUKA, N., and S. SATO. 1953. A contribution to the knowledge of the rust-flora of Mt. Fuji and its vicinities, Fuji-Hakone National Park. (Contributions to the rust flora of Eastern Asia. VII.) Nagaoa 3: 57-100. Japanese and English text.

Phakopsora pachyrhizi Syd. collected on variety Davidzu. Stages of rust are cited as II, (III). (p. 69)

193. HOPKINS, J. C. F. 1932. A list of plant diseases occurring in Southern Rhodesia. Supplement 2. (June, 1931, to May, 1932.) Rhodesia Agr. Jour. 29: 462-467.

First report of Bacterium glycineum and mosaic virus for Southern Rhodesia.

194. HOPKINS, J. C. F. 1939. A descriptive list of plant diseases in Southern Rhodesia (and their control.) Southern Rhodesia Dept. Agr., Mem. 2. 51pp.

Reports the occurrence of stem blight (Ascochyta pisi Lib.), Macrophomina phaseoli, mosaic, and Rhizoctonia violacea from Salisbury. Bacterial blight (Bacterium glycineum) destroys leaves in wet weather. (p. 21)

195. HOPKINS, J. C. F. 1950. A descriptive list of plant diseases in Southern Rhodesia and list of bacteria and fungi. Southern Rhodesia Dept. Agr., Mem. No. 2 (Revised 2nd Edition). 106pp.

Lists the occurrence of Ascochyta pisi Lib., Pseudomonas glycinea Coerper, and a root rot (Sclerotium rolfsii) on Glycine max in the Salisbury area. (p. 34)

196. HUNG, C. H., and K. C. Liu. 1961. Soybean spraying experiment for rust disease control. Agr. Res. (Taiwan) 10 (1): 35-40. Chinese text, English summary.

Phakopsora pachyrhizi Syd. (rust) is one of the destructive diseases found throughout the growing areas of Taiwan. For best control, either Dithane M-22 or Dithane Z-78 at the rate of 300 grams per 100 liters of water is suggested.

197. IAKIMOVICH, E. D. 1938. Virus diseases of the soybean. in Dunina, M. S. (Editor) Virus Diseases of Plants. Collection 2: 226-227. (Russian text).

197A. IAKIMOVICH, E. D. 1938. (Virus diseases of soybeans.) Moscow Vsesoiuz. Nauch.-Issled. Inst. Severnogo Zernovogo Khoz. i Zernobob. Kul'tur, Trudy 3: 79-115. Russian text.

198. IIDA, W. 1951. Studies on soy-bean anthracnose. Kyoto Univ. Inst. Pl. Dis., Forsch. auf dem Geb. der Pflanzenkrank. 4: 169-173 Japanese text, English summary.

Isolated Glomerella glycines from diseased pods from Kyoto, Japan. Hyphae overwintered in diseased pods. In inoculation tests, infection occurred in pods only and was especially vigorous on the younger pods.

199. (IIZUKA, N., and I. IIDA.) 1961. (On lucerne mosaic virus isolated from ladino clover.) Phytopath. Soc. Japan, Ann. 26: 69. Abst. #111. Japanese text.

Inoculation produced systemic infection, Virus was sap-transmitted and also transmitted by Aphis medicaginis, Myzus persicae, and Macrosiphum pisum. The virus was isolated from ladino clover. Tohoku Agr. Expt. Sta., Japan. (Taken from abst. in Rev. Appl. Mycol. 41: 157. 1962)

200. IKATA, S., and K. YAMAUTI. 1941. Notes on the haustoria of some species of Peronospora. Phytopath. Soc. Japan, Ann. 10:326-328. Japanese text.

Peronospora manshurica on soybean. Description of haustoria.

201. IKATA, S. 1951. The Diseases of Food Crops. No. 1. Rice Plants and Beans. (Series of Plant Pathology No. 6) 2+12+320 pp. illus. Tokyo, Asakura Shoten. Japanese text.

A well illustrated, comprehensive work that appears to be a review. Soybean diseases dealt with include: Downy mildew (Peronospora manshurica); brown spot (Septoria glycines); bacterial blight (Bacterium sojae var. japonicum); purple speck (Cercospora kikuchii); frogeye leafspot (Cercospora daizu); anthracnose (Glomerella glycines); and rust (Phakopsora sojae). (Taken from an abst. in Rev. Appl. Mycol. 31:458. 1952).

202. INFORME DEL DEPARTAMENTO DE BOTANICA Y FITOPATOLOGIA. 1938. (Information from the Department of Botany and Plant Pathology.) Venezuela Min. de Agr. y Cria, Mem. Adicional Vol. (Labores Tec.) 2:41-72. Spanish text.

In 1937 Cercospora glycines Cke. (leaf spot), Ascochyta pisi Lib. (leaf spot), and Bacterium sojae Wolf (on leaves) were collected on Glycine max in Venezuela. (p. 54)

203. IN ITALIEN IN DEN JAHREN 1911 UND 1912 BEOBACHTETE PFLANZENKRANKHEITEN. 1913. (Plant diseases observed in Italy during 1911 and 1912). Zeitschr. für Pflanzenkrank. 23:201-205. German text.

Observed Phyllosticta sojaecola and Septoria sojina in Italy. (p. 202)

204. ITO, K. 1949. Studies on "Murasaki-mompa" disease caused by Helicobasidium mompa Tanaka. Tokyo Gov. Forest Expt. Sta. Meguro, Bull.43:1-126. English text.

Sterilized seed were sown in autoclaved pots on April 30. On June 14, small bits of mycelium from a pure culture were used to inoculate the soil. By September 16, both large and small roots were covered with purplish-brown rhizomorphs of the fungus. In some parts of the heavily attacked roots the parenchymatous tissues were destroyed so completely that only the periderm and stele portion retained their original shape. On the root surface, pin-head shaped sclerotia were formed abundantly. (p. 18) Cultural characteristics, morphology, taxonomy, physiology, and cytology of the fungus are discussed. The fungus is known to occur in Japan, Formosa, Korea, and Manchuria.

205. ITO, K., and T. KOBAYASHI. 1958. Studies on some anthracnoses of woody plants. V. Anthracnose fungi of black locust. Tokyo Govt. Forest Expt. Sta. Meguro, Bull. 108:1-29. (English text).

A natural infection suspected to be Colletotrichum glycines severely attacked black locust seedlings in a nursery causing up to 80% infection and killing seriously affected plants. Cross-inoculation studies, with isolates from soybean and black locust, showed that they were pathogenic to both species but were slightly more pathogenic on their original hosts.

206. (JAGOE, R. B., and E. F. ALLEN). 1952. Notes on current investigations, July to September, 1952. Malayan Agr. Jour. 35:218-227 and Fed. Malaya States Dept. Agr., Ann. Report 1952:39. 1953.

Corticium solani, the perfect stage of Rhizoctonia solani, was found for the first time in Malaya on soybeans.

207. JEHLE, R. A., ANNA E. JENKINS, K. W. KREITLOW, and HELEN S. SHERWIN. 1952. An outbreak of Phyllosticta canker and leaf spot of soybeans in Maryland. Plant Dis. Rptr. 36:155-158.

208. JENKINS, ANNA E. 1951. Sphaceloma scab, a new disease of soybeans discovered by plant pathologists in Japan. Plant Dis. Rptr., 35: 110-111.

209. JOHNSON, H. W., and D. W. CHAMBERLAIN. 1953. Bacteria, fungi, and viruses on soybeans. In Plant Diseases, the Yearbook of Agriculture, pp. 238-247.

Symptoms and general information on soybean diseases.

210. JOHNSON, H. W., and R. A. KILPATRICK. 1953. Soybean diseases in Mississippi in 1951-1952. Plant Dis. Rptr. 37:154-155.

211. JOHNSON, H. W., D. W. CHAMBERLAIN, and S. G. LEHMAN. 1954. Diseases of soybeans and methods of control. U.S.D.A. Circular No. 931.

General description of soybean diseases.

212. JOHNSON, H. W., D. W. CHAMBERLAIN, and S. G. LEHMAN. 1955. Soybean diseases. U.S.D.A. Farmers' Bulletin No. 2077.

Non-technical description of soybean diseases, primarily for farmers, elevator men, and farm advisers.

213. JOHNSON, H. W., and J. P. JONES. 1962. Purple stain of guar. Phytopathology 52:269-272.

Cercospora kikuchii infects both guar and soybean. Isolates from both hosts are cross-infectious.

214. JOHNSTON, A. 1958. A note on fungicidal seed dressing of soya bean, groundnut, and long bean. Malayan Agr. Jour. 41:152-155.

Poor germination of soybean seed led to chemical seed treatment trials. Agrosan GN, Mergamma B, Spergon, Fersan, Flit 406, and Tritoftoral were used in the form of dusts. All gave satisfactory results, the best being Fersan which gave a 53% increase in germination.

215. JOHNSTON, A. 1960. A Preliminary Plant Disease Survey in Sarawak. 17 pp. (Plant Prod. & Protect. Div.,FAO, Rome).

Phakopsora pachyrhizi Syd. was found at Kuching-Serian Rd. during the survey of September 12 to October 4 (1960?) (p 6).

216. JOHNSTON, A. 1960. A supplement to a host list of plant diseases in Malaya. Commonwealth Mycol. Inst., Mycol. Papers 77. 30 pp.

Reports occurrence of a leafspot caused by Choanephora cucurbitarum (Berk. & Rav.) Thaxt., a leaf rot caused by Corticium solani, and a stem die-back caused by Glomerella glycines. (p.12).

217. JOHNSTON, A. 1960. A Preliminary Plant Disease Survey in North Borneo. 43 pp. (Plant Prod. & Protec. Div., FAO, Rome).

Purple seed stain (Cercospora kikuchii) infected pods and seed. Anthracnose (Colletotrichum truncatum) caused a black spotting of the pods, is seed-borne and may cause poor germination and seedling canker. Leaf spots were caused by Mycosphaerella sp. and Phyllosticta glycines Tehon & Daniels. Survey made in Sept. 1959.

218. JOHNSTON, A. 1961. A preliminary plant disease survey in Netherlands New Guinea. Netherlands New Guinea Dienst Econ. Zaken., Meded. Landbouwk. Ser. 1961 (4). 55 pp.

Occurrence of Cercospora kikuchii as the cause of a minor leafspot disease affecting only old plants. This was the only disease reported on soybeans for Netherlands New Guinea.

219. JONES, J. P. 1958. Isolation of sporulating strains of Cercospora kikuchii by selective sub-culturing. Phytopathology 48:287-288.

220. JONES, J. P., and E. E. HARTWIG. 1959. A simplified method for field inoculation of soybeans with bacteria. Plant Dis. Rptr. 43:946.

Ten moderately infected leaflets blended in blendor with 300-600 ml. water. After standing 1-2 hours, strain through 2 layers of cheesecloth, make up to 1 gal. and apply as spray. Minced, infected leaflets can be stored for 12-24 months in capped jars at 0-20° F. and used in the same way.

Xanthomonas phaseoli var. sojensis and Pseudomonas tabaci.

221. JONES, J. P. 1959. Purple stain of soybean seeds incited by several Cercospora species. Phytopathology 49:430-432.

222. KACHALOVA, Z. P. 1962. (Some results from the use of antisera produced at the Experimental Station for Plant Protection.) Moscow Timiriazev. Sel'skokhoz. Akad., Izv. 1962(3):214-220. (Russian text.)

Sera were obtained in 1955 specific for Pseudomonas sojae, Xanthomonas phaseoli var. sojense, and X. glycines. Serological tests of resistance to bacterioses in soybean varieties were not always in agreement with field results. Also developed sera specific for soybean mosaic virus. (Taken from an abst. in Rev. Appl. Mycol. 42:242-243. 1963)

223. KAHN, R. P., and F. M. LATTERELL. 1955. Symptoms of bud blight of soybeans caused by tobacco- and tomato-ringspot viruses. Phytopathology 45:500-502.

224. KAHN, R. P. 1956. Seed transmission of the tomato ringspot virus in the Lincoln variety of soybeans. Phytopathology 46:295.

225. KAUFMANN, M. J., and J. W. GERDEMANN. 1958. Root and stem rot of soybean caused by Phytophthora sojae n. sp. Phytopathology 48:201-208.

226. KAWASE, Y. 1955. On the resistance of Pellicularia rolfsii causing sclerotial blight of soy-bean to mercuric chloride. Osaka Pref. Univ., Bull. Ser. B (Japan) 5: 167-174. Japanese text, English summary and tables.

When the fungus is cultured by the use of sclerotium as inoculum repeatedly on medium containing 10^{-4}mol. mercuric chloride, its growth is inferior to the original strain in the first generation, but in the 4th generation it begins to grow better than the latter and becomes so resistant as to be able to grow on medium containing 10^{-3}mol. mercuric chloride. In the 8th generation the fungus grows in the same degree with the 4th generation, but such acquired resistance is lost instantly by putting back once on non-mercuric chloride medium. This strain is also resistant to mercuric nitrate, copper sulfate and cupric chloride, and its growth is better than the original strain. Its pathogenic intensity on soybean is almost the same as the original

227. KENNEDY, B. W. 1964. Moisture content, mold invasion, and seed viability of stored soybeans. Phytopathology 54: 771-774.

Fungi were isolated from 15% of soybean seed collected in 1961 and from 12% of samples collected in 1962, the predominant genera being Alternaria, Fusarium, Aspergillus, and Penicillium. The A. glaucus group persisted for at least 11 months in seeds stored at 6.5% moisture, whereas A. niger completely disappeared.

228. KENNEDY, B. W. 1965. Tolerance of Pseudomonas glycinea to freezing. Phytopathology 55: 415-417.

Freezing did not alter the pathogenicity of Pseudomonas glycinea. Survival of the bacteria was greater if the bacteria were frozen while in infected leaves of soybeans than if they were suspended in solution of glycerol, ethylene glycol, lactose or glucose. Survival in frozen leaves over a period of 6 months was enhanced by submerging infected leaves in water before freezing.

229. KENNEDY, J. S., M. F. DAY, and V. F. EASTOP. 1962. A Conspectus of Aphids as Vectors of Plant Viruses. 114 pp. London, Commonw. Inst. Ent.

A compilation from the literature (443 references) up to the end of 1960 and an extension of the aphid part of an earlier compilation. (Day, M. F. & Margaret J. Bennetts (1954). A Review of Problems of Specificity in Arthropod Vectors of Plant and Animal Viruses. 172pp. Canberra, Australia. 729 references.) Viruses are listed according to the original host name of the virus. No other hosts are listed.

230. KERNKAMP, M. F., and J. W. GIBLER. 1951. Resistance in soybeans to root rot caused by Rhizoctonia solani. (Abs.) Phytopathology 41: 21.

231. KERNKAMP, M. F., and J. W. GIBLER. 1951. Diseases of soybeans new to Minnesota. Plant Dis. Rptr. 35: 509-510.

Report of first occurrence of brown stem rot in Minnesota. Notes on occurrence of Diaporthe phaseolorum var. batatatis.

232. KHAN, A. M. 1954. pH and pathogenicity of Rhizoctonia on soyabeans and peas. Indian Sci. Cong. Assoc., Proc. (Part IV: Late Absts) 41: 30.

The race of Rhizoctonia solani Kuhn studied showed optimum growth at pH 6-7. In pathogenicity tests under controlled conditions, the same race was highly pathogenic to soybeans at pH 4-6. Since the soil lacked calcium and magnesium, the high mortality rate was attributed to mineral deficiency rather than to difference in pH level.

233. KHU, TSZI-CHEN. 1958. (Immunological characteristics of the causal organism of soybean bacteriosis.) Moskov. Ordena Lenina Sel'skokhoz. Akad. im K.A. Timiriazeva, Dok. 39: 230-237. (Russian text).

Describes the use of antigens in the identification of bacteria on soybeans. Those studied were Bacterium sp., Pseudomonas sojae, Xanthomonas glycines, and X. phaseoli var. sojense.

234. KILPATRICK, R. A., and H. W. JOHNSON. 1953. Fungi isolated from soybean plants at Stoneville, Mississippi, in 1951-1952. Plant Dis. Rptr. 37: 98-100.

235. KILPATRICK, R. A., and E. E. HARTWIG. 1955. Effect of planting date on incidence of fungus infection of Ogden soybean seeds grown at Walnut Hill, Florida. Plant Dis. Rptr. 39: 174-176.

Cercospora kikuchii and Phomopsis sojae were the most frequently isolated fungi from apparently healthy seed.

236. KILPATRICK, R. A., and E. E. HARTWIG. 1955. Fungus infection of soybean seed as influenced by stinkbug injury. Plant Dis. Rptr. 39: 177-180.

Although a number of fungi were isolated from stinkbug-injured seeds, the data suggested that stinkbug injury was not necessary for fungus infection of soybean seeds.

237. KILPATRICK, R. A., and H. W. JOHNSON. 1956. Sporulation of Cercospora species on carrot leaf decoction agar. Phytopathology 46: 180-181.

In this article, particular attention is devoted to C. kikuchii from soybeans.

238. KILPATRICK, R. A. 1956. Longevity of Cercospora kikuchii on soybean stems. Phytopathology 46: 58.

239. KILPATRICK, R. A. 1957. Fungi associated with the flowers, pods, and seeds of soybeans. Phytopathology 47: 131-135.

240. KINGSLEY, T. 1960. Downy mildew of soya bean. Plant Path. 9:38.

First report of downy mildew (Peronospora manshurica) for England. Found at Suffolk on variety Bansei.

240A. KINOSHITA, S., and T. NISHIZAWA. 1955. On the soybean-sleeping blight, a new disease of soybean. Kyushu Agr. Res. 15: 74-76. Japanese text.

(Probably Septogloeum sojae)

241. KINOSHITA, S., and T. NISHIZAWA. 1955. On the soybean blast Septogloeum sojae n. sp. 1. Effect of the chemicals to the causal fungus. Kyushu Agr. Res. 16: 117. (Japanese text).

242. KISPATIC, J. 1950. A contribution to the list of parasitic fungi of Croatia. Hrvatsko Prirodoslovno Drustvo., Glasnik Biol. Sekcije Ser. 2 B, 2/3: 44-50. 1948/1949. (1950). Croatian test, English summary.

Phyllosticta sojicola Mass. is described as sometimes very damaging. First report for Croatia. (p. 47).

243. KITANI, K., Y. INOUE, and T. NATSUME. 1960. Ecological studies on the mobilization of lime-sulphur spraying. Efficacy to the wheat brown rust and the soybean rust. Shikoku Agr. Expt. Sta. (Zentsuji, Japan), Bull. 5: 225-306. Japanese text, English summary.

When soybean plants in the field are sprayed with lime and sulphur, a gaseous substance evolves from deposits of the fungicide. This substance affects the uredosorus already formed, reducing germination rate. It also depresses the infectivity of scattered spores.

244. KITANI, K., Y. INOUE, and T. NATSUME. 1960. Studies on the effectiveness of lime-sulphur spraying on the wheat brown rust and the soybean rust. Shikoku Agr. Expt. Sta. (Zentsuji, Japan) Bull. 5:307-318. Japanese text, English summary.

Studies were made on the relation of spray concentration to the control; the relation of amount of spraying to disease development; the effect of spreaders, metal salts, and polyethylene polysulphide added to the spray mixture.

245. KITANI, K., and Y. INOUE. 1960. Studies on the soy bean rust and its control measure. (Part 1) Studies on the soybean rust. Shikoku Agr. Expt. Sta., (Zentsuji, Japan), Bull. 5:319-342. Japanese text, English summary.

Rust occurs in various soybean growing areas and is especially serious in the Southwest of Japan. In Japan it occurs mainly from August to December, in Formosa from March to May, and in Okinawa in April. In the field, the initial attack is frequently on the lower leaves where it becomes well developed. Taxonomic notes on the fungus are given. Uredospores germinate in the range 8-32°C, the optimum approximately 25°C. Under natural conditions, the uredospores are likely to lose their germinating power after 30-40 days.

245A. KITANI, K., Y. INOUE, and T. NATSUME. 1960. Studies on the soybean rust and its control measure. (Part 2) Studies on the control measure on the soybean rust. Shikoku Agr. Expt. Sta. (Zentsuji, Japan), Bull. 5: 343-358. Japanese text. English summary.

246. KLARMAN, W. L., and J. W. GERDEMANN. 1963. Induced susceptibility in soybean plants genetically resistant to Phytophthora sojae. Phytopathology 53: 863-864.

247. KLARMAN, W. L., and J. W. GERDEMANN. 1963. Resistance of soybeans to three Phytophthora species due to the production of a phytoalexin. Phytopathology 53: 1317-1320.

248. KLEIN, H. H. 1959. Etiology of the Phytophthora disease of soybeans. Phytopathology 49: 380-383.

249. KLEIN, H. H. 1959. Factors affecting development and morphology of reproductive structures of the soybean root and stem rot Phytophthora. Phytopathology 49: 376-379.

250. KLEMENT, Z., G. L. FARKAS, and L. LOVREKOVICH. 1964. Hypersensitive reaction induced by phytopathogenic bacteria in the tobacco leaf. Phytopathology 54: 474-477.

Pseudomonas tabaci was used as a check to show differences in symptomatology induced by pathogen and non-pathogens in tobacco.

251. KLESSER, PATRICIA J. 1954. New records of legume virus diseases in England. Plant Path. 3: 84.

Reports that soybean mosaic has previously been reported for England, and that soybean is susceptible to pea stunt virus, alsike clover mosaic virus, and white clover mosaic virus.

252. KLESSER, PATRICIA J. 1960. Virus diseases of lupins. Bothalia 7: 207-231.

Inoculated soybeans showed the following reactions to:LUPIN VIRUS A: No local reaction. Systemic reaction - a diffuse chlorotic mottle develops. LUPIN VIRUS B:No local reaction. Systemic reaction - chlorotic flecks on the younger leaves. LUPIN VIRUS C: Local reaction - necrotic lesions in 12 days. Systemic reaction - the first trifoliates develop chlorotic flecks with necrotic rings, and soon drop. Most other leaves have vivid chlorotic flecks and later a mosaic with necrotic specks. BEAN YELLOW MOSAIC VIRUS: Local reaction - small necrotic lesions develop in 12 days. Systemic reaction - young leaves show chlorotic spots or flecks, and on the later ones a diffuse mottle. PEA MOSAIC VIRUS 4: Local reaction - chlorotic spots develop in 4-5 days. Systemic reaction - after a month the leaves show chlorotic spotting. The older leaves also have necrotic specks. The plant is stunted. Physical properties and identification of the viruses are discussed. (South Africa)

253. KLESSER, PATRICIA J. 1960. Virus diseases of peas and sweet peas. Bothalia 7: 253-282.

The following are results of inoculation. PEA MOSAIC VIRUS on Glycine javanica: A symptomless carrier. PEA STUNT VIRUS on G. max: Local reaction - leaves become chlorotic and drop. Systemic reacion - after a chlorotic spotting the leaves develop a mottle with some yellow specks. Old leaves have a chlorotic network. PEA WILT VIRUS - NEW STRAIN on G. javanica: A symptomless carrier. On G. max: Local reaction - chlorotic spots which later have a necrotic ring. There is also some veinal necrosis. Systemic reaction - In 9 days young leaves show veinclearing. This becomes a dark green mottle on the next formed leaves, which are puckered. Some small necrotic spots on older leaves. LUCERNE MOSAIC VIRUS - NECROTIC RING STRAIN on G. max: No local reaction. Systemic reaction - Chlorotic spotting of young leaves, later ones are mottled and slightly crinkled. BEAN CHLOROSIS VIRUS - STRAIN B on G. max: No local reaction. Systemic reaction - A diffuse chlorotic mottle on most leaves. BEAN YELLOW MOSAIC VIRUS - NECROTIC STRAIN on G. max: No local reaction. Systemic reaction - a diffuse chlorotic spotting. TOMATO SPOTTED WILT VIRUS on G. max: Local reaction - necrotic specks with chlorotic haloes. Leaves later become almost orange. No systemic reaction. Identification of these viruses is discussed. (South Africa)

254. KLESSER, PATRICIA J. 1960. Virus diseases of cowpeas. Bothalia 7: 233-251.

The following are results of inoculation. COWPEA MOSAIC VIRUS A on Glycine javanica: Local reaction - necrotic spots with chlorotic rings in 4 days. Systemic reaction - leaves may have chlorotic areas or if symptomless, virus can be recovered. On G. max: Local reaction - chlorotic spots may develop. Systemic reaction - chlorotic spotting and vein flecking in 9 days. The next leaves develop a mottle with dark green blisters and irregular yellow areas. They are elongated and malformed with a crinkled surface. Older leaves have necrotic specks. COWPEA MOSAIC VIRUS B on G. javanica: Local reaction - necrotic lesions develop in 8 days. Systemic reaction - some leaves have large chlorotic blotches which are puckered. On G. max: Local reaction - chlorotic rings develop in 10 days and leaves drop. Systemic reaction - chlorotic specks and irregular areas causing distortion. Necrotic specks on old leaves. CUCUMBER MOSAIC VIRUS STRAIN on G. max: Local reaction - may be a general chlorosis in 4 days. Systemic reaction - after 11 days a vein clearing of young leaves. Later leaves are mottled with dark green blisters with severe malformation. Identification of these viruses is discussed. (South Africa)

255. KLESSER, PATRICIA J. 1961. The virus disease of beans. Bothalia 7: 521-558.

Four strains of bean chlorotic ringspot virus were isolated from four different, non-Phaseolus, naturally infected, legumes in South Africa. Strain B was isolated from soybean. The following are results of inoculation. Strain A on Glycine javanica: Local reaction - chlorotic spots in 6 days. Systemic reaction - a diffuse chlorotic spotting. Strains A & B on G. max: Local reaction - chlorotic specks or ring and line patterns. Systemic reaction -in addition there are necrotic specks and with strain A the plant is stunted and rosetted. Strain C on G. max: No local reaction. Systemic reaction - leaves have chlorotic patterns, irregular dark green areas and are crinkled. Strain D on G. max: Local reaction - slight veinal necrosis. Systemic reaction - same as Strain C.

256. KLESSER, PATRICIA J. 1961. The virus diseases of Crotalaria, Glycine and Medicago species. Bothalia 7: 497-519.

A GLYCINE STRAIN of ALFALFA MOSAIC VIRUS was isolated from naturally infected plants of G. javanica in South Africa. 25 legume species, when inoculated, showed various reactions. On soybean: Local reaction - necrotic specks, rings and veins. Systemic reaction - in 3 weeks young leaves develop a chlorotic net-work or star flecks. Later leaves had vivid yellow areas and the plant was stunted. ALSIKE CLOVER MOSAIC VIRUS 1: Both Glycine max and G. javanica showed some symptoms when inoculated. Inoculation of WHITE CLOVER MOSAIC VIRUS on G. max: Local reaction - small necrotic specks with chlorotic halos in 10 days. Systemic reaction - as the young leaves develop a vein-clearing and chlorotic spotting. Later leaves are mottled with necrosis developing in the chlorosis causing a leaf pucker. On G. javanica: a symptomless carrier. SOYBEAN MOSAIC VIRUS: found in Northern, Eastern and Western Transvaal. (South Africa)

257. KLYKOV, A. P. 1951. (Bacteriosis of the cotyledons of soybean and its control with us.) Mikrobiologiia (SSSR.) 20: 33-40. Russian text.

Bacterium sojae and B. solanacearum were always found on seeds and sprouts infected with cotyledonary bacteriosis. Their pathogenicity was proved experimentally. Other experiments demonstrated the presence of severe sprout infection and the possible localization of bacteria in the seed coat, sprout and bud. The disease is undoubtedly seed transmitted. It is characterized by difference in concavity, color, and gloss, and sometimes by rupture of the seed coat. The exclusion of seed showing these characteristics reduces the percentage of infected sprouts but does not completely eliminate the disease. The systematic increase of infected sprouts in unsterilized soil indicates the probability of soil infection. Seed treatment with Granosan powder at 5 kg./ton produced a larger number of sprouts and greater yield. - Biol. Absts. 26 #4626. 1952.

The author states "Should be noted that isolates 20 and 37 could be identified as Bacterium medicaginia var. phaseolicola with symptoms almost indistinguishable from those caused by Bacterium sojae." (Krasnodar, USSR.)

258. KLYKOV, A. P. 1953. (Means of controlling bacterial diseases of soybeans.) Zemledelie SSSR. 1(5): 121-122. Russian text.

Measures for control included application of protective material (such as the use of dyes) to the seed and the effectiveness of such against bacteriosis of the cotyledons, blight, and leaf spots.

259. KLYKOV, A. P. 1963. (Bacterial diseases of soybean). Zashch. Rast. ot Vred. i Boleznei 8 (6): 35-36. Russian text.

Common in U.S.S.R. are cotyledon bacteriosis (damage 30-95%) caused by Pseudomonas glycinea and P. solanacearum, brown angular leafspot (P. glycinea) occurring from flowering to yellowing of the leaves, "rust-brown bacteriosis" due to undetermined yellow-pigment bacteria, and wilt caused in the Krasnodar region by P. solanacearum. Seed treatment with granosan, mercuran, and thiram (2 kg./ton) gave the best control. - Rev. Appl. Mycol. 43 #625. 1964.

260. KOBAYASHI, K. 1959. The spore dissemination of soybean blast fungus Septogloeum sojae and the control method by fungicides. Kyushu Agr. Res. 21: 156-157. Japanese text.

261. KOCH DE BROTOS, LUCIA, and CELIA ROASSO. 1955. (List of plant diseases in Uruguay) Uruguay Dir. de Agron., Publ. 106. 65pp. Spanish text.

Macrophoma phaseoli Maubl. causes a rot at the base of the stem. It appears sporadically, and at times is severe. (p.24)

262. KOCHMAN, J., and T. STACHYRA. 1957. Material on virus diseases of plants in Poland. Rocz. Nauk Rolnicz. Ser. A-Roslinna 77: 297-325. Polish text, short English summary.

Soybean mosaic (soja virus 1) is discussed as to symptoms. The disease was not important but in 1956, in one area (Bydgoszczy), it affected about 20% of the plants. (p. 309)

263. KODAMA, T., and J. B. BANCROFT. 1964. Some properties of infectious ribonucleic acid from broad bean mottle virus. Virology 22: 23-32.

Young primary leaves of Bansei soybeans were used for quantitative local-lesion assays, since they gave consistent results.

264. KÖHLER, E. 1964. (General Virus Pathology of Plants. A Survey.) vii + 178pp. Berlin. German text.

Discusses developments in plant virology since the 1954 edition of Sorauer's Handbuch der Pflanzenkrankheiten.

265. KOSHIMIZU, S., and T. IIZUKA. 1957. (Relationship between the brown speck of soybean seed and soybean mosaic.) Phytopath. Soc. Japan, Ann. 22: 18. (Japanese abstract).

Brown speck which has been believed to be the result of some unknown environmental condition is reported to result from soybean mosaic infection.

266. KOSHIMIZU, Y. and N. IIZUKA. 1963. Studies on soybean virus diseases in Japan. Tohoku (Japan) Natl. Agr. Expt. Sta., Bull. 27: 1-103. Japanese text. English summary.

An alfalfa mosaic virus strain is widely spread in the Tohoku district infecting white and red clovers and often spreads to soybeans if grown close by. Virus is transmitted by the aphid Aulacortum matsumuraeanum. A bean yellow mosaic virus strain was isolated from soybeans in 1956 and is rare in the Tohoku district. Transmissable mechanically and by Myzus persicae. Stunt virus: appears to be a new virus first isolated in 1955 from foliage of a soybean variety immune to mosaic. Virus easily transmitted by pressed juice and by Aphis glycine, Myzus persicae, Rhopalosiphium prunifolia and seed. Early infection of plant can produce up to 50% seed transmission. Decrease in growth and seed yield due to varietal differences was 20-80% in growth and 10-50% in yield.

Soybean mosaic virus: Field symptoms and inheritance of immunity are discussed. Spraying for aphid control had no effect on disease incidence. Soybean mosaic virus strain: Symptoms almost the same as those for mosaic. All varieties that were susceptible to mosaic and several that were immune were susceptible to this virus. In the field it only occurred after July of each year. A virus isolated in 1955 had overall symptoms like mosaic. Easily transmitted mechanically but aphid transmission failed. Seed transmission of about 2% was observed twice.

267. KOVACHEVSKI, I. 1955. (Parasitic fungi new for Bulgaria. VI.) Bulgar. Akad. na Nauk Bot. Inst., Izv. 4:301-312. Bulgarian text, English summary.

Sclerotium bataticola Taub. was observed on soybeans at Pavlikeni in 1952. This is the first report on this host for Bulgaria. (p.310)

268. KRASNOVA, MME. M. V. 1963. (Bacterial diseases of soybeans and their control in the Northern Caucasus). Agrobiologiia 1963: 738-743. Russian text.

Yields are reduced by up to 50% by cotyledon bacteriosis and up to 38% by leaf bacteriosis, both caused by Xanthomonas phaseoli var. sojense and Pseudomonas glycinea. Of the fertilizers tested only the bacterial preparations phosphorobacterin and nitrobacterin reduced cotyledon infection. (Adapted from Rev. Appl. Mycol. 43 #3360. 1964)

268 A. KRASNOVA, MME. M. V. 1963. (Influence of certain physical factors on the disinfection of soybean seeds affected by bacteriosis.) Mikrobiol. Zhurn. (Kiev) 25 (5): 50-52. Ukrainian text. Short English summary.

Treating soybean seed with high-voltage electric currents and ultrasound helps to disinfect them under definite conditions and also raises the seed germinating capacity in a number of cases. (Krasnodar Krai) For where a translation may be obtained, see: Tech. Translations 14 (5): 10. 1965.

269. KREITLOW, K. W. 1955. How to cut disease losses. Soybean Digest 15(8): 8-9.

270. KREITLOW, K. W., HELEN C. BOYD, D. W. CHAMBERLAIN, AND J. M. DUNLEAVY. 1957. A bibliography of viruses infecting the soybean (Glycine max (L.) Merr.) Plant Dis. Rptr. 41: 579-588.

271. KULIK, M. M. 1957. Purple-stained soybean seed. Phytopathology 47: 22.

Studies of the relative numbers of purple-stained seed and infected but unstained seed in 189 lots of seed from 14 locations showed that the number of stained seed in any lot varied directly with the number of infected but apparently healthy seed. Thus a high percentage of purple stained seed indicates a high percentage of infected but nonstained seed also, and is a good index of the overall percentage of infected seed in any lot.

272. KURATA, H. 1953. Outbreak of soy bean scab at Tohoku district. Climatic conditions affecting the outbreak and varieties relations. Japan. Jour. Pl. Protec. 45 (vol. 7 no. 3/4):108-112. Japanese text.

273. KURATA, H., and K. KURIBAYASHI. 1954. Soy bean scab caused by Sphaceloma glycines sp. nov. Phytopath. Soc. Japan, Ann. 18: 119-121. English text.

First report of Sphaceloma on soybean. First discovered during a protracted rainy period in July, 1947, in the Nagano Prefecture, Japan. On the leaves, the scabs are circular to irregular, usually more or less elevated on the upper surface, sometimes coalescent, minute to about 4 mm. in diameter, frequently visible on both surfaces of the leaf, commonly "vinaceous buff", often fading to "pale drab gray". On the stem: minute spot to elliptical elongate scab to 1 cm. or more in length, up to 2 cm. long when confluent, generally "vinaceous buff" in color, sometimes with reddish brown margin. On the pods: in general, young scabs are red to "Kaiser brown", mature ones dark olive to black in color, lighter in the center with reddish brown margins.

274. KURATA, H. 1960. Studies on fungal diseases of soybean in Japan. Natl. Inst. Agr. Sci. (Tokyo), Bull. Ser. C, 12: 1-153. Japanese text, English summary.

Twenty-four miscellaneous fungi were commonly isolated from shelled seed. Cercospora kikuchii, Diaporthe phaseolorum var. sojae, and Ascochyta sojaecola were frequently isolated from symptomless seed, indicating systemic infection. Scab (Sphaceloma glycines) and rust (Phakopsora pachyrhizi Syd.) are listed as serious diseases although they occur in limited areas. Uredo sojae P. Henn., Uromyces sojae (P. Henn.) Syd., and Phakopsora sojae (P. Henn.) Sawada are considered synonyms of Phakopsora pachyrhizi. Colletotrichum truncatum (Schw.) Andrus & Moore is one of the major diseases of soybeans. Ophionectria sojae Hara is described as the cause of a disease that appears on soybeans planted on the dikes of paddy fields. Peronospora manshurica, Septoria glycines, Phyllosticta sojicola, Sclerotium bataticola are reported.

275. KUYAMA, S., and T. TAMURA. 1957. Cercosporin. A pigment of Cercosporina kikuchii Matsumoto et Tomoyasu. I. Cultivation of the fungus, isolation and purification of pigment. II. Physical and chemical properties of cercosporin and its derivatives. Amer. Chem. Soc. Jour. 79: 5725-5729.

Isolation, purification, and properties of a deep red pigment, "cercosporin," isolated in abundance from dried mycelia on malt-extract-peptone-glucose cultures of Cercosporina (Cercospora) kikuchii at Nagoya University, Anzyo, Japan. Good growth on Raulin-Thom's medium and potato extract-glucose. Spectrum analysis suggests that cercosporin is a polyhydroxy derivative of a polycyclic quinone with an extended quinone system, in which 2 phenolic hydroxyl groups are present in positions peri to the quinone carbonyls. The physical and chemical properties of noranhydrocercosporin and its derivatives are given.

276. LEAKEY, C. L. A. 1964. Dactuliophora, a new genus of Mycelia Sterilia from tropical Africa. Brit. Mycol. Soc., Trans. 47: 341-350.

Dactuliophora glycines Leakey on Glycine max and G. javanica in Northern Rhodesia. Leaf spots large, on both sides of the leaf and often spreading to the leaf margins and becoming confluent. Individual spots more or less circular, up to 4 cm. diam., very broadly and rather indistinctly zonate. Appearance similar on each side of the leaf except for the sclerotia sparsely scattered on the lower side. Mycelium immersed, colorless, diffuse throughout host tissues within the spot, aggregated in plectenchymic masses beneath the sclerotiophores. No means of reproduction other than by sclerotia have been seen.

277. LEHMAN, S. G., H. MURAKISHI, and J. H. GRAHAM. 1951. A leaf spot of soybean caused by Sclerotium rolfsii. Plant Dis. Rptr. 35:167-168.

S. rolfsii described as a leaf spot for the first time. Found at Rocky Mount, North Carolina. Lesions circular in outline, medium brown to light brown or straw color with a narrow band of darker necrotic tissue at the border. The narrow border was more conspicuous on the smaller than on the larger spots. Concentric circular markings were visible on many of the lesions. Most lesions were 1 cm. or less in diameter. Small clump of white mycelium visible at center of many of the lesions, and on many lesions a small spherical brown sclerotium replaced the mycelial clump.

278. LEHMAN, S. G. 1952. Survival of the purple seed stain fungus in soybean seeds. Phytopathology 42: 285 (Abs.)

Found that the fungus did not survive until the third planting season after harvest, but frequently survived until 3 months before the second planting season. Infected seeds were adjusted to moisture levels of 6.3, 10.8, and 15.3 percent and stored for ten months in closed jars at 8, 12, 16, 20, 24, and 28 degrees C. Only slight loss of viability of the fungus occurred at 8 or 12 degrees regardless of moisture content. Loss of viability of the fungus in seeds of high and medium moisture was more rapid than in those of low moisture content, and was markedly accelerated by storage at 16 degrees or above. At the higher temperature and moisture levels the seed lost viability less rapidly than the fungus in the seed.

279. LEHMAN, S. G. 1953. Race 4 of the soybean downy mildew fungus, Peronospora manshurica. Phytopathology 43: 460-461

280. LEHMAN, S. G. 1953. Systemic infection of soybean by Peronospora manshurica as affected by temperature. (Abs.) Elisha Mitchell Sci. Soc. J. 69: 83.

Rapidity of germination of oospore encrusted seed seems to affect the percentage of seedlings that become systemically infected. When these seed germinate slowly, as in cold (55°F.) soil, up to 40% of the seedlings show systemic infection. If the seeds are planted in warm soil (65° F. or above), none of the seedlings show systemic infection. Either the oospores on the seed fail to infect the seedling at 65° F., or the seedlings outgrow the fungus. Planting after the soil has reached an average temperature of 65° F. appears to offer a means of controlling systemic infection and thus reduce the quantity of early inoculum in the field.

281. LEHMAN, S. G. 1958. Physiologic races of the downy mildew fungus on soybeans in North Carolina. Phytopathology 48: 83-86.

New races designated as 3A, 5, 5A, and 6. Ten varieties are suggested as a set of differential varieties for separating all races thus far described in the United States: Mukden, Illini, Richland, Roanoke, Acadian, C.N.S., Ogden, Palmetto, Woods Yellow 1, and S-100.

Race 3A is regarded as a sub-race of Race 3 (Geeseman). It differs from Races 4, 5 and 5A by its ability to incite severe disease on C.N.S. and on Ogden and from Race 6 by its inability to infect Mukden and S-100. Races 5 and 5A differ from Race 4 by their ability to incite severe disease on S-100 and light to moderate disease on Illini, Ogden, and Palmetto, varieties immune from Race 4. They differ from Race 6 by their inability to infect Mukden and Richland and their ability to cause disease on Acadian.

Race 6 causes severe disease on the varieties Illini, C.N.S., and Ogden, which are immune from Race 4.

Race 4 causes no symptoms on any of the varieties that are parasitized by Races 1, 2, and 3 of Geeseman.

282. LEPIK, E. 1939. Estonia: Plant diseases new to the country. Internatl. Bull. Pl. Protect. 13: 105-106.

Phyllosticta sojaecola Mass. reported on the leaves in 1935.

283. LING, L. 1951. Bibliography of soybean diseases. Plant Dis. Rptr. Supp. 204:110-173.

284. LISTER, R. M. 1960. Transmission of soil-borne viruses through seed. Virology 10: 547-549.

Leaves of seedlings grown from seed of infected varieties showed a high percentage of seed transmission for tomato black ring virus, and little or no transmission for raspberry ringspot virus and Arabis mosaic virus. (Scotland)

285. LISTER, R. M., and A. F. MURANT. 1961. Soilborne viruses: Viruses with nematodes as vectors. Scot. Hort. Res. Inst., Annu. Rpt. (1960/61) 8th: 56.

In tests made, cherry leaf roll virus was transmitted through 100% of seeds of soybean.

286. LITZENBERGER, S. C., and J. A. STEVENSON. 1957. A preliminary list of Nicaraguan plant diseases. USDA Pl. Dis. Rptr. Suppl. 243: 1-19. Spanish version published in Ceiba 8: 19-39. 1959.

Cited as occurring on soybeans growing on the Pacific side are: Cercospora canescens, C. kikuchii, Helminthosporium vignicola, and Xanthomonas phaseoli var. sojensis.

287. LITZENBERGER, S. C., MARIE L. FARR, and H. T. LIP. 1962. A preliminary list of Cambodian plant diseases. 29pp.

Reports the occurrence on soybeans of: Cercospora flagellifera Atk., Colletotrichum gloeosporioides Penz. (Black spot), Corynespora cassiicola (Berk. & Curt.) Wei (Target spot), Mycosphaerella cruenta (Sacc.) Lan., Myrothecium roridum Tode ex Fr., Phakopsora pachyrhizi Syd., Vermicularia sp., Sclerotium rolfsii Sacc., and Xanthomonas phaseoli (E.F. Smith) Dows.

288. LO, T.C. 1964. Control of seed borne diseases by radioactive irradiation. Acad. Sinica Inst. Bot., Bot. Bull. New Ser. 5: 1-16. English text.

Results indicated that high dosage level radiation could inhibit the germination of soybean seed while the pathogen (Cercospora kikuchii) was more resistant. Radioactive irradiation had no influence on the sporulation of the fungus. These studies confirmed that seed borne diseases could not be controlled by means of radioactive irradiation. (Taiwan)

288A. LUSIN, V. 1960. (Cercospora kikuchii - soybean disease.) Savremena Poljoprivreda 8: 601-604. Croatian text.

Symptoms, biology, taxonomy, morphology, etc., are discussed. Yugoslavia.

289. MACNEILL, B. H., and H. ZALOSKY. 1957. Histological study of host-parasite relationships between Septoria glycines Hemmi and soybean leaves and pods. Canad. J. Bot. 35: 501-505.

Penetration is stomatal without an appressorium. Subsequently, spread of the pathogen is intercellular in the mesophyll tissue and in the parenchyma sheath and phloem of the leaf veins. Infection of the seed may occur directly at the point of contact of the seed with the wall or by systemic invasion via the placenta and funiculus. This study establishes conclusively that S. glycines is seed-borne in the soybean.

290. MAISURIAN, N. A., and A. I. MORDASHOV. 1963. (Method of separating seed infected by fusariosis from soybean sowing material.) Selek. i Semen. 28 (1): 77-78. Russian text.

Fusarium infected seed, when immersed, swells more quickly than healthy seed, as water penetrates more easily through the injured testa. Seeds swollen in 2, 4, and more hours had germination rates of 1, 30, and 80%, respectively, and there was a notable difference in health status of the seedlings during post-emergence growth. As the size of the swollen seed increased 1.5- 2 times, separation of most of the infected seed is possible with nets. (Adapted from Rev. Appl. Mycol. 42: 717. 1963.)

291. MANNINGER, E., and MARIA ANATAL. 1964. (A study of the disinfection of seeds.) Zentralb. für Bakteriol. Abt. II, 118: 379-382. (German text, short English summary.)

A 1% solution of Thimerosale completely disinfected soybean seed without affecting germination. A 0.5% solution was also effective. Fungi involved are not named. (Hungary)

292. MARCHIONATTO, J. B. 1949. (Exotic fungi). Lilloa 21: 135-153. Spanish text.

Rhizoctonia bataticola Taub. was identified on a root from Porto Alegre, Brazil, 1941. Numerous blackish sclerotia in the pith characterizes this fungus.

293. MARTINSON, C. A. 1963. Inoculum potential relationships of Rhizoctonia solani measured with soil microbiological sampling tubes. Phytopathology 53: 634-638.

294. MARTYN, E. B. 1933. Preliminary list of diseases of economic plants in British Guiana. Kew Roy. Gard., Kew Bull. Misc. Inform. 1933: 107-110.

Phomopsis sojae Lehm. (occurrence only recorded).

295. MARTYN, E. B. 1942. Diseases of plants in Jamaica. Jamaica Dept. Sci. & Agr., Bull. (n.s.) 32. 34pp.

The variety Palmetto is less susceptible to mosaic than the variety Trinidad. If the attack is not too severe, it can be controlled by roguing. Collectotrichum glycines only becomes serious if wet weather prevails when the crop is ripening. In this case, a large percentage of the pods become moldy and fail to develop beans. The disease is seed-borne.

296. MATHUR, R. S. 1954. Diseases of pulse crops in Uttar Pradesh (India). Agr. & Anim. Husb. 5: 24-28.

Most of the soybean crops of Uttar Pradesh are grown at altitudes of 4,000-7,000 feet. Root-rot, due to Rhizoctonia and Fusarium, causes the plants to die prematurely in August and is responsible for heavy losses in some years. The disease also occurs in the plains. The upper portion of the plant droops and turns brown. Roots show a brown-black discoloration at the ground level and black streaks are formed, in some cases, on the woody portion of the stem. Tiny black sclerotia appear abundantly on the discolored portions of both root and stem. Cercospora daizu Miura is of common occurrence, particularly on late-maturing varieties and in severe cases causes crop losses.

297. MATSUMOTO T., W. YAMAMOTO, and S. HIRANE. 1932. Physiology and parasitology of the fungi generally referred to as Hypochnus sasakii Shirai. 1. Differentiation of the strains by means of hyphal fusion and culture in differential media. Soc. Trop. Agr. (Taiwan), Jour. 4: 370-388.

Nineteen strains are compared; there is a key based on growth in potato dextrose agar. The soybean strain, collected in Formosa, attacked leaves, petioles, and stems.

298. MATUO, T., Y. SAKURAI, and H. KURATA. 1958. On wilt of soybean found in Japan and the causal Fusaria. Shinshu Univ. (Japan) Fac. Text. & Seric., Res. Rpt. 8: 6-13. Japanese text, English summary.

Fusarium blight or wilt was found for the first time in various districts of Japan. Morphological investigations and inoculation tests showed the causal fungi to be Fusarium oxysporum f. tracheiphilum and F. moniliforme. The latter could not be distinguished from the causal fungus of the "Bakanae" disease of rice. Seven Japanese geographic strains of Fusarium are discussed in tables (in English).

299. MCALISTER, D. F., and D. W. CHAMBERLAIN. 1951. Water flow through soybean stems infected with brown stem rot. Plant Dis. Rptr. 35: 318-319.

300. McGUIRE, J. M. 1964. Efficiency of Xiphinema americanum as a vector of tobacco ringspot virus. Phytopathology 54: 799-801.

Transmission from cucumber to cucumber, but no report for soybeans.

301. McINTOSH, A. E. S. 1951. Federation of Malaya. Annual Report of the Department of Agriculture for the year 1949. 87pp.

Myrothecium sp. stated to be the cause of a leafspot which commonly attacks various vegetables including soya bean. (p. 55)

302. McLEAN, D. M. 1960. Diseases caused by tobacco ringspot virus in the Lower Rio Grande Valley of Texas. Plant Dis. Rptr. 44: 738-741.

Soybean bud-blight observed in the Lower Rio Grande Valley is a yellow strain of TRSV.

303. McLEAN, D. M. 1962. Common weed hosts of tobacco ringspot virus in the Lower Rio Grande Valley of Texas. Plant Dis Rptr. 46: 5-7.

304. MEHTA, P. R., D. N. GARG, and S. C. MATHUR. 1950. Important diseases of food crops, their distribution in India and Uttar Pradesh. Uttar Pradesh (India) Dept. Agr., Tech. Bull. 2. 13 pp.

Cercospora daizu causes a leafspot that first appears during Nov. and Dec. throughout Uttar Pradesh. Also occurs throughout the rest of India. Damage is slight. (p. 8)

305. MEJIA, A. S. 1954. Sclerotium wilt of supa (Sindora supa Merr.). Philippine Jour. Forestry 9: 119-132. 1953 (1954)

A Sclerotium rolfsii strain from supa proved to be pathogenic on soybean seedlings.

306. MILLAR, R. L. 1956. Studies on the nature of pathogenicity of Xanthomonas phaseoli (E. F. Sm.) Dowson and of X. phaseoli var. sojensis (Hedges) Starr and Burk. Diss. Abs. 16: 426.

In beans and soybeans.

307. MIYASAKA, S. 1954. (Soybean improvement. I. Preliminary observations on the behavior of some soybean varieties in São Paulo, Brazil.) Bragantia 14: 9-17. Portuguese text. English summary.

Observations were made on the resistance of 18 soybean varieties, from São Paulo and foreign countries, to bacterial pustule (Xanthomonas phaseoli var. sojensis.)

308. MOLNAR, B., and J. VOROS. 1963. Stem rot of soybeans caused by Sclerotinia sclerotiorum (Lib.) de Bary in Hungary. Novenytermeles 12: 51-56. Hungarian text. (Tables & figures have English translations p. 56).

In Hungary in 1962, stem rot occurred sporadically in the varietal trials. The pathogen occurred primarily in irrigated plots on soybeans following sunflower. Under irrigation, Harosoy, Clark, Ford, and a variety from Farmer City, Illinois, are particularly susceptible, the stem rot incidence being 7-14%. In the varieties generally grown in Hungary the disease appears only sporadically and does not seem to be especially dangerous.

309. MORGAN, F. L. 1963. Bacterial pustule of soybeans. Soybean Digest 23: 8-9.

310. MORGAN, F. L. 1963. Soybean stem and leaf infections by Phytophthora megasperma var. sojae. Plant Dis. Rptr. 47: 880-882.

Leaves and stems of soybean were infected by Phytophthora megasperma var. sojae. Susceptible plants leaf-inoculated with the pathogen on cotton became systemically infected; resistant leaves similarly inoculated also became infected, but infection remained localized. Field-tolerant and susceptible plants in the field became infected when clay naturally infested with the fungus was placed in branch axils. Natural inoculum in clay infected plants more frequently than pure cultures of the pathogen. Symptom development was more rapid and extensive when naturally-infested clay was used. Natural leaf infections that resulted from inoculum in clay occurred during June 1963. Symptoms of naturally-infected plants were similar to those that developed on artificially-inoculated plants.

311. MORGAN, F. L. 1964. Infection of cranesbill by the soybean Phytophthora. Plant Dis. Rptr. 48: 140-141.

312. MORGAN, F. L., and E. E. HARTWIG. 1964. Pythium aphanidermatum, a virulent soybean pathogen. Phytopathology (Abs) 54: 901.

313. MORGAN, O. D. 1964. Experimental infection of Nicotiana species and interspecific crosses with Cercospora nicotianae and Cercospora kikuchii. Plant Dis. Rptr. 48: 693-695.

C. kikuchii from soybean infected 14 of 25 of Nicotiana spp., and all of 10 crosses. C. nicotianae from tobacco infected all N. spp. and crosses, but not soybean.

314. MORWOOD, R. B. 1956. A preliminary list of plant diseases in Fiji. Fiji Dept. Agr., Agr. Jour. 27: 51-54.

Occurrence of Sclerotium rolfsii.

315. MULLER, A. S. 1941. (Survey of diseases of cultivated plants in Venezuela, 1937-1941) Soc. Venezolana de Cienc. Natl., Bol. 7: 99-113. Spanish text.

Cites the occurrence of: Bacterium sojae Wolf, a common foliage disease; Sclerotium rolfsii Sacc., causes wilt in humid sections; Cercospora glycine Cke,, white spot of leaves on mature plants; and soybean mosaic which is rare.

316. MULLER, A. S., and C. CHUPP. 1942. (The Cercospora of Venezuela.) Soc. de Venezolana de Cien. Nat., Bol. 8: 35-59. Spanish text.

Report of collection of Cercospora sojina Hara at Maracay, 1937. (p. 56)

317. MULLER, A. S., and C. CHUPP. 1950. Cercospora in Guatemala. Cieba 1: 171-178

Cercospora sojina collected at Chimaltenago, 1941.

317A. MULLER, A. S. 1950. A preliminary survey of plant diseases in Guatemala. Plant Dis. Rptr. 34: 161-164.

Soybeans are affected near maturity by two leaf spots caused by Cercospora sojina and Mycosphaerella pinodes. In wet seasons Sclerotium rolfsii sometimes causes a wilt and Corticium vagum causes a pod rot resulting in a great seed loss.

318. MUNDKUR, B. B. 1938. Fungi of India. Supplement I. India Imper. Council Agr. Res. Sci. Monog. 12. 54pp.

Peronospora manshurica on leaves at Kashmir. Butler and Bisby think that this specimen agrees with P. trifoliorum.

319. MUNJAL, R. L. 1960. A commonly occurring leaf spot disease caused by Myrothecium roridum Tode. ex.Fr. Indian Phytopath. 13: 150-155.

Natural infection with Myrothecium roridum has been found at Delhi on soybean and 17 other economic crops. The disease appears during the rainy season as small, circular, tan spots with a broad violet to brown margin surrounded by zones of translucent areas which give the appearance of concentric rings. Later, on these translucent areas the fructifications of the fungus appear as dark green sporodochia surrounded by a rim of white, hair-like mycelia, which become conical or flattened. Generally, the incidence of the disease is low.

320. MURAKISHI, H. H. 1951. Purple seed stain of soybean. Phytopathology 41: 305-318.

Describes symptoms on hypocotyl, stems, leaves and petioles hitherto unreported in America. Also on seeds and pods like those reported in the Orient.

The fungus did not sporulate on any of a variety of media in culture. It sporulated on living seeds in the laboratory at temperatures of 18° to 27° C.

321. MURAS, V. A. 1963. On bacterial wilt of soybeans in the Ukraine. Microbiol. Zhurn. (Kiev) 25 (5): 42-49. Ukrainian text. English summary.

During 1959/61 only isolated cases of bacterial wilt (Pseudomonas solanacearum Smith) were observed and these in a somewhat attenuated form in soybean plantings. The bacterium, isolated from leaves, stems, pods and seeds, was identified by morphological, biochemical, cultural, pathogenic, and serological properties. In the Ukraine the bacteria are, apparently, only beginning to adapt themselves on plants, and wilting is, therefore, weakly manifested and considerably less frequent.

322. MURAS, V. A. 1964. (Pustular bacteriosis of soybean and the biology of its causative agent.) Mikrobiol. Zhurn. 26 (4): 62-66. Ukrainian text. English summary.

Although Xanthomonas phaseoli var. sojense is fairly widespread in the Ukraine, its incidence is only from 1-16%. Affects all above-ground parts of the plant but found mostly on the leaves. (For where a translation may be obtained see: Tech. Translations 14 (5): B-45 & B-1. 1965.)

322A. MURAS, V. A. 1964. (Bacterial diseases of soybean and their causal agents.) Nauchn. Konfer, Molod. Uchen. Biologov. Kiev, Akad. Nauk. SSSR. 1: 34-35. (? Ukrainian text).

In 1,310 infected samples there were 3 types of bacteriosis: bacterial blight (Pseudomonas glycinea), pustular bacteriosis (Xanthomonas phaseoli var. sojense), and bacterial wilt (Pseudomonas solanacearum). The first two are widespread and most harmful in the Ukraine. Soybean seeds and plant remains play an important role in the transmission of infection. As a result of seed treatment with the preparations 150 & 152 (analogues of pseudoallicin), and phytobacteriomycin, germination was increased by 3-6.4%, yield by 10-30%, and the incidence of bacteriosis decreased by 1-5%. - Rev. Appl. Mycol. 44 #1326. 1965.

323. NAGATA, T. 1962. Report to the Government of Yugoslavia on improvement of soybean cultivation. FAO Expanded Tech. Asst. Program, FAO Rpt. 1465. 22pp.

In 1961 there was little damage from diseases, unlike the previous wet years when downy mildew (Peronospora manshurica) and purple spot (Cercosporina kikuchii) were prevalent. Suggested control for downy mildew was Bordeaux mixture and other chemicals such as organic mercury compounds. (p. 17)

323A. NARIANI, T. K. 1960. Yellow mosaic of mung (Phaseolus aureus L.). Indian Phytopath. 13: 24-29.

Glycine max was susceptible when inoculated by white flies (Bremisia tabaci Gen.) with symptoms appearing after 18 or 19 days. The young leaves show faint chlorotic areas which turn yellow later. The yellow areas are more predominant in the new growth and increase in size to form large yellow patches. (India)

324. NARIANI, T. K., and K. V. PINGALEY. 1960. A mosaic disease of soybean (Glycine max (L.) Merr.). Indian Phytopath. 13: 130-136.

Mosaic (Soja virus 1 Smith) was found during a routine survey near New Delhi, India, in September 1956. Twenty-eight varieties growing in the field were infected, infection varying from 7 to 30% depending on the variety. Symptoms are described. Four species of aphids were found to be capable of transmitting the virus.

325. NATTRASS, R. M. 1952. Annual Report of the Senior Plant Pathologist, 1950. Kenya Dept. Agr., Annu. Rept. 1950. Vol. II: 72-77.

Synchytrium dolichi on Glycine javanica, determined from a specimen received from Kenya. (p. 76)

326. NATTRASS, R. M. 1961. Host lists of Kenya fungi and bacteria. Commonwealth Mycol. Inst., Mycol. Papers 81, 46 pp.

Records the occurrence on Glycine max of: Alternaria tenuissima (Nees ex Fr.) Wilts., and Synchytrium dolichi (Cooke) Gaum. On G. javanica of Ascochyta sojaecola Abramoff, Cercosporella sp. and Synchytrium dolichi.

327. NEELY, R. D. 1957. A study of Fusarium root rot and wilt of soybeans. Diss. Abs. 17: 2132-2133. Univ. of Missouri.

328. NEMLIENKO, F. E., and T. A. KULIK. 1958. Insects as carriers of cotyledon bacteriosis in soybeans. Vestnik Sel'skokhoz. Nauki 3(5): 129-131. Russian text, English summary.

Bags containing insects were placed over soybean plants at various times, beginning when the beans were first setting. Bacteriosis damage was found only in experiments involving Carpocoris fuscispinus Boh.

328A. NEMLIENKO, E. F., AND T. O. KULIK. 1960. (Cotyledon bacteriosis of soybean.) Ukr. SSR. Akad. Sil's'kohos. Nauky, Visnyk Sil's'kohos. Nauky 1960 (7): 96-98. Russian text.

Symptoms developed only on the cotyledons of seeds infected in the field during formation and ripening, so that the annual variation in infection is related to the insect population. Carpocoris fusispinus was demonstrated as playing a major role in transmission. Plant detritus and soil do not play a significant role in the transmission of the pathogen, which is not seed transmissible to the new crop, nor is the incidence of infection in the crop dependent on that of the seed material. Seed treatment with 50% thiram reduced infection 3-8-fold, and in some years completely eliminated the disease. (Adapted from Rev. Appl. Mycol. 41: 116. 1962)

329. NIKOLIC, V. 1951. A new soybean disease in Yugoslavia- Preliminary note. Zastita Bilja 8: 39-40. Serbian text, English summary.

Peronospora manshurica found at Bogatic in 1951, the first report from Yugoslavia. Leaf infection and seed incrustation noted.

330. NISHIZAWA, T., and S. KINOSHITA. 1954. On the varietal resistance of soybeans to the bacterial pustule disease. Kyushu Agr. Res. 14: 203-206. Japanese text, Tables in English.

Inoculations of 9 varieties with Xanthomonas phaseoli var. sojense by needle puncture methods and by different spraying methods showed a variation in susceptibility of some of the individual varieties as to which method was used.

331. NISHIZAWA, T., S. KINOSHITA, and H. YOSHII. 1955. On the soybean blast and its causal fungus Septogloeum sojae n.sp. Phytopath. Soc. Japan, Ann. 20: 11-15. Japanese text, English summary.

A Latin description of the fungus is given. It causes superficial brown obscure spots or streaks on leaves (especially leaf veins), petioles, stems, and pods. Collected in Kyushu, Japan, Aug. 4, 1954.

332. NOBLE, R. J. 1931. New South Wales: Plant diseases. Internatl. Bull. Pl. Protect. 5: 202-205.

Cites one record of bacterial pustule (Bacterium phaseoli sojense) and one record of bacterial blight (B. glycineum).

333. NOVAKOVA-PFEIFEROVA, J. 1958. (A new fungus disease of soybeans in our country). Preslia 30: 369. An abstract. Czech. text.

Ascochyta sojaecola was found on soybean in Moravia in 1955 affecting the cotyledons, leaves, and stems. This is the first report for Czechoslovakia.

334. NOVAKOVA-PFEIFEROVA, J. 1959. A contribution to the recognition of soybean mycosis in Czechoslovakia. Ceskoslov. Akad. Zemedel. Ved Sborn., Rostlinna Vyroba 32: 431-436. Czech text, short English summary.

Ascochyta sojaecola Abramoff first found in Czechoslovakia in 1955 as a serious parasite on soybeans. Geographical distribution, history, taxonomy, symptoms, economic importance, and control are discussed.

335. NOVAKOVA-PFEIFEROVA, J. 1964. (A contribution to the study of Peronospora manshurica on soybean in Czechoslovakia.) Ceska Mykol. 18: 42-47. Czech text, short German summary.

The disease was recorded in Moravia in 1959. Symptoms and geographical distribution are described.

336. NUMIC, R. 1962. Contribution to the knowledge of the parasitic fungi in Bosanska Posavina (Yugoslavia). Zashtita Bilja 67/68: 141-146. Croatian text, English summary.

The following parasitic fungi were observed on soybeans during 1960/61: Ascochyta pisi and Septoria sojina. The latter is reported for the first time from this territory.

337. NUTTONSON, M. Y. 1952. Ecological Crop Geography and Field Practices of the Ryukyu Islands, Natural Vegetation of the Ryukyus, and Agro-climatic Analogues in the Northern Hemisphere. 106pp. Amer. Inst. Crop Ecology.

Cites the occurrence of Peronospora manshurica (N.) Syd. and Phakopsora sojae (H.) Saw. (p. 94)

338. OKABE, N., and M. GOTO. 1955. Bacterial plant diseases in Japan. I. A list of bacterial diseases and their pathogens. Shizuoka Univ. Facul. Agr. (Iwata), Rpt. 5: 63-71. Japanese text, English summary.

Lists bacterial spot caused by Pseudomonas glycinea var. japonica (Taki.) Sav. and bacterial pustule caused by Xanthomonas phaseoli var. sojense (Hedges) Starr & Burkh.

338A. (OMORI, H.) 1964. (Research on labor saving in insect and disease control and prevention work. 2. On the effectiveness of wide spraying on diseases and pests of sugar beets and soybeans.) Soc. Plant Protect. N. Japan, Annu. Rpt. 15:17-18.

Japanese text.

339. ONTARIO DEPT. OF AGRICULTURE. 1956. Control of soybean insects and diseases. Ontario Dept. Agr. C. 275, 9pp.

340. ONTARIO AGRICULTURAL COLLEGE. 1957. Control of soybean insects and diseases. Ontario Dept. Agr. C. 275, 9pp.

341. ONTARIO DEPT. OF AGRICULTURE. 1959. Control of insects and diseases of corn, beans, and soybeans. Ontario Dept. Agr. C. 326, rev., 16pp.

342. PAI, C. K. 1957. Notes on the Peronosporaceae in Northeastern China. Acta Phytopath. Sinica 3: 137-154. Chinese text, short English summary.

Peronospora manshurica (Naum.) Syd. on Glycine max and G. ussuriensis Regel & Maack. Taxonomic notes in Chinese. Syn. P. trifoliorum DeBy. var. manshurica Naum.

342A. PARRIS, G. K. 1959. A revised host index of Mississippi plant diseases. Miss. State Univ. Bot. Dept., Misc. Publ. 1. 146pp.

Cites 18 fungi, bacteria and viruses that occur in Mississippi on soybeans.

343. PATEL, M. K., Y. S. KULKARNI, and G. W. DHANDE. 1949. Dolichos biflorus L.- a new host of Xanthomonas phaseoli sojense (Hedges) Dowson. Current Sci. (India) 18: 83-84.

The disease was found on Dolichos biflorus in the Belgaum District of Poona, India, August 1948. The organism resembles X. phaseoli sojense in morphological, cultural, and physiological characters; since both these pathogens are cross-inoculable, D. biflorus is considered a new host for this pathogen.

344. PATEL, M. K., and Y. S. KULKARNI. 1954. A review of bacterial plant disease investigation in India. Indian Phytopath. 6: 131-140. 1953 (1954)

There are strong reasons to believe that Xanthomonas phaseoli-sojense gained entry into India from the West, since India depended largely upon foreign countries for seeds of soybeans. (p. 134)

345. PATHAK, N. C., and R. N. GHOSH. 1962. Fungi of Uttar Pradesh (India). Lucknow (India) Natl. Bot. Gard. Bull. 62: 146pp.

Cercospora daizu Miura reported on soyabean. (p. 111).

345A. PATRICK, Z. A. 1954. The antibiotic activity of soil microorganisms as related to bacterial plant pathogens. Canad. Jour. Bot. 32: 705-735.

Pseudomonas glycinea appeared to be especially vulnerable to the deleterious effects of antagonistic soil microflora. In platings made, 118 antagonistic microorganisms were observed. 56 of these were isolated of which 14% produced large inhibition zones.

346. PAUL, H. L. 1961. (The form and structure of phytopathogenic viruses.) Zentbl. f. Bakt., Abt. II, 114: 694-717. German text.

A review of the literature (203 citations) compiled at Biologischen Bundesanstalt, Brunswick, Germany. The measurements of soybean mosaic virus are given in a table of comparison of plant viruses whose form and structure are known.

347. PEDERSON, V. D. 1958. A new method of obtaining systemic infection of soybeans by Peronospora manshurica. Iowa Acad. Sci. Proc. 65: 146-149.

348. PEDERSON, V. D. 1961. Downy mildew (Peronospora manshurica) of soybeans. Diss. Abs. 22(3): 703.

349. PETCH, T. 1922. Additions to Ceylon fungi. II. Peradeniya (Ceylon) Roy. Bot. Gard., Ann. 7: 279-322.

A new species of Phomopsis on dead stems of seedlings, named P. phaseoli Petch. Collected July 1918 at Peradeniya, Ceylon. Pycnidia immersed, scattered, black, thin-walled, lenticular, 0.25mm. diameter. Spores hyaline, narrow-oval or oblong-oval, 3-6 x 1.5-2 μ, or linear, uncinate, 14-16 μ long. (p. 311)

350. PETERSEN, L. J., J. E. DeVAY, and B. R. HOUSTON. 1963. Effect of gibberellic acid on development of hypocotyl lesions caused by Rhizoctonia solani on red kidney bean. Phytopathology 53: 630-633.

351. PETRAK, FR., and H. SYDOW. 1936. (A small contribution to the knowledge of the fungus flora of Japan) Ann. Mycol. 34: 237-251. German text.

Taxonomic description in Latin and German of the new species Phomopsis glycines Petrak. Specimen from Kyoto, Japan. (pp. 240-241)

352. PEYTON, G. A., and C. C. BOWEN. 1963. The host-parasite interface of Peronospora manshurica on Glycine max. Amer. J. Bot. 50: 787-797.

353. PIETKIEWICZ, T. A. 1959. Some observations on the microflora of soybean seeds. Rocz. Nauk Rolnicz. Ser. A- Roslinna 79: 1077-1090. Polish text, English summary.

From various parts of Poland, 162 samples of soybean seed that were to be used for breeding and planting were found to be contaminated by a number of fungi and bacteria: Fusarium spp. and Botrytis cinerea were found frequently, and caused seedling diseases and seed decay. They could not be eliminated by seed disinfection. Peronospora manshurica caused milky white spots on the seed-coat. Other microorganisms associated with soybean seeds were Penicillium spp., Alternaria spp., Trichothecium roseum, Rhizopus nigricans, Mucor spp., Aspergillus sp., Ascochyta sp. and unidentified bacteria.

354. PLANT BREEDING SECTION. 1963. North. Rhodesia Min. African Agr., Annu. Rpt. 1962: 22.

In 3 variety trials, the variety Hill had a higher resistance than others to bacterial blight (Pseudomonas glycinea).

355. PLANT DISEASES AND PESTS IN DENMARK. 1942. Tidsskr. for Planteavl 48: 1-90. Danish text, English summary.

Peronospora manshurica (Naum.) Syd. found on soybean leaves from Lolland. This is a first report from Denmark (pp. 74 & 89).

356. (1964?) PLANT DISEASE SURVEY FOR THE TWELVE MONTHS ENDING 30th June, 1963. Biology Branch, New South Wales Department of Agriculture, 33rd Annual Report.

Leaf spot (Cercospora sp.) on Glycine javanica was prevalent and widespread on the far North Coast during the late winter and early spring of 1962. The fungus resembles Cercospora canescens which is a new record for New South Wales. (pp. 10 & 36)

357. 1964. PLANT PATHOLOGY. Northern Rhodesia Min. African Agr., Annu. Rpt. 1963: 23-25.

Bacterial blight of soybeans yielded 3 organisms: Pseudomonas glycinea, Xanthomonas phaseoli f.sp. sojense, and Pseudomonas tabaci. Soybean is therefore a confirmed host of the wildfire bacterium (P. tabaci.) A similar disease was noted on the wild Glycine javanica.

358. PROBST, A. H., and K. L. ATHOW. 1958. Additional studies on the inheritance of resistance to frogeye leafspot (Cercospora sojina) of soybeans. Phytopathology 48: 414-416.

359. QUANTZ, L. 1961. (Studies on bean common mosaic virus and soybean mosaic virus.) Phytopath. Zeitschr. 43: 79-101. German text, English summary.

Thirteen plant species proved systemically susceptible to isolate S1174 of soybean mosaic virus. Electron microscope studies revealed the presence of thread-like virus particles 748 mμ in length and 12-13 mμ in width, which were morphologically indistinguishable from those of common bean mosaic and yellow bean mosaic. Cross-protection and serological experiments indicated a relationship between these 3 viruses. (Germany)

360. QUIROS CALVO, MANUEL. 1950. (Chaetoseptoria wellmanii Stev., a disease of legumes.) Suelo Tico 4: 137-139. Spanish text.

A leafspot on Soja sp. (seed from Cuba) and 7 other legumes (seed from Venezuela and Honduras) is reported to have occurred in Costa Rica. Symptoms and control measures are discussed.

361. RAILLO, A. I. 1950. (Fungi of the Genus Fusarium.) 415 pp, illus. Russian text.

This book discusses, in general, morphology, culture, and descriptions of the species. A new simplified taxonomic system is presented. Control measures are given. Six Fusarium taxa are reported on soybean seed and/or germinating seed. F. oxysporum is reported on the cotyledons. Localities of the reports in the USSR are given.

362. RAMAKRISHNAN, K. 1955. Some aspects of soil fungal ecology. Indian Acad. Sci., Proc. Sect. B, 41: 110-116.

Macrophomina phaseoli (Maubl.) Ashby was grown from bits of roots isolated from the Vandalur soils, (India), but was not one of the fungi that appeared on dilution plates of soil. It seems reasonable to assume that this fungus does not exist in free soil, but inside vegetable debris which it colonizes, and remains there either as mycelium or in some resting stage. (p. 111)

363. RAMAKRISHNAN, T. S. 1951. Additions to fungi of Madras - XI. Indian Acad. Sci., Proc. Sect. B, 34: 157-164.

Uromyces sojae (P. Henn.) Syd on living leaves of plants grown at the Agricultural Research Station, Palur, in 1950. Butler & Bisby (1931) stated that no rust on Glycine soja has in reality been found in India. There is no doubt about this host plant. (pp. 162-163).

364. RANGASWAMI, G. 1962. Bacterial Plant Diseases in India. 163 pp.

Discusses symptoms and briefly treats etiology, spread, and control of bacterial pustule (Xanthomonas phaseoli-sojense (Hedges) Dows.)

365. RANGASWAMI, G. 1962. Pythiaceous Fungi (A Review) 276pp. Bibliog. 111pp. New Delhi, India.

366. RATTRAY, A. 1960. The soya bean in Rhodesia. Rhodesia & Nyasaland Dept. Agr. Res. & Spec. Ser., Proc. Annu. Conf. Prof. Off. 4: 34-43. Also in: Rhodesia Agr. Jour. 57:182.

Soybeans have suffered less from disease in the past 20 years than any of the commonly grown legumes. Bacterial blight (Pseudomonas glycinea) is probably the most serious and widespread. Pythium and Rhizoctonia seedling diseases occur but do little harm in the Salisbury area. (p. 37)

367. REICHERT, I. 1939. Palestine: Diseases of field crops. Internatl. Bull. Pl. Protect. (Rome) 13: 204M-210M.

It is reported that Sclerotium bataticola Taub caused black spots on the stems and a wilt, and Uromyces sojae (Henn.) Syd. caused a leaf rust in this list of diseases collected and studied from 1923 to 1938.

368. RESCONICH, E. C. 1963. Movement of tobacco necrosis virus in systemically infected soybeans. Phytopathology 53: 913-916.

369. REYES, G. M. 1957. Diseases of soybeans. Philippines Bur. Pl. Indus.,. Pl. Indus. Digest 27th Anniversary Issue Jan. 1957: 61.

Bean mosaic is definitely known to be seed-borne. Virus-free and infected seed have been found in the same pod.

370. RICHTER, H., and R. SCHNEIDER. 1953. (Investigations on morphological and biological differentiation of Rhizoctonia solani.) Phytopath. Zeitschr. 20: 167-226. German text.

In studies at the Biological Institute, Berlin-Dahlem, the authors divided into 6 groups, according to their ability to form hyphal anastomoses, 176 strains from 45 hosts in 24 families originating in Europe, North and South America, Asia, and Australia. There were also 6 morphological groups which paralleled the fusion groups except for a few aberrant strains. The characters which appeared to be common to a particular group were: the width of the hyphae; color and zoning of the submerged mycelium; color, abundance, and texture of the aerial mycelium; and color and production of pseudosclerotia. (Adapted from Rev. Appl. Mycol. 33: 109-110. 1954)

371. RIEUF, P. 1960. (Pathogenic and saprophytic organisms on plants in Morocco) Morocco Serv. de la Rech. Agron. et de l'Enseign., Cahiers de la Rech. Agron. 9. 359 pp. French text.

Soybean mosaic Gardner & Kendrick or Soja virus I Smith was observed by the author at Rabat, April 1953. This was the only soybean disease listed for Morocco.

372. RILEY, E. A. 1956. A preliminary list of plant diseases in Northern Rhodesia. Commonwealth Mycol. Inst., Mycol. Papers 63. 28 pp.

Pyrenochaeta sp. causing a leafspot in Eastern Province.

373. RILEY, E. A. 1958. Lyamungu, plant pathology. Tanganyika Dept. Agr., Annu. Rpt. 1957 (Part II): 72-74.

First report of anthracnose (Glomerella glycines) for Tanganyika.

374. RILEY, E. A. 1960. A revised list of plant diseases in Tanganyika Territory. Commonwealth Mycol. Inst., Mycol. Papers 75. 42 pp.

Reports the occurrence of: leaf spots (Ascochyta phaseolorum Sacc.) and Cercospora kikuchii (Mats. & Tomoy.) M. W. Gardner; Anthracnose (Glomerella glycines Lehmann & Wolf); and a root disease (Macrophomina phaseoli (Maubl.) Ashby.

375. Robertson, D. G. 1963. Further studies on the host range of cowpea yellow mosaic virus. Trop. Agr. (Trinidad) 40: 319-324.

Inoculation of soybeans produced irregularly shaped light green patches between the veins and sometimes the entire leaf became chlorotic. (Nigeria)

376. ROBINSON, R. A. 1960. Notes on Kenya agriculture. VIII: important plant diseases. East African Agr. Jour. 25: 131-146.

Reports the occurrence of Synchytrium dolichi which causes brown, raised scabs on stems and pods. Control: Use varieties that are immune. (p. 134)

377. ROSS, J. P., and T. J. SMITH. 1963. Brown stem rot of soybean in North Carolina and Virginia. Plant Dis. Rptr. 47: 329.

First report of the disease in the South.

378. ROSS, J. P. 1963. Transmission of bean pod mottle virus in soybeans by beetles. Plant Dis. Rptr. 47: 1049-1050.

Cerotoma trifurcata shown to be a vector, retaining the virus for at least 2 days after acquisition feeding.

Diabrotica undecimpunctata howardii transmitted in one instance.

379. SABET, K. A. 1959. Studies in the bacterial diseases of Sudan crops. III. On the occurrence, host range and taxonomy of the bacteria causing leaf blight diseases of certain leguminous plants. Ann. Appl. Biol. 47: 318-331.

The author transfers Xanthomonas phaseoli var. sojense from a varietal rank to a special form so that more weight is given to pathogenic adaptation than to the minute differences in cultural and biochemical characters. Comparative studies of 8 Xanthomonas taxa showed that the organisms were indistinguishable by the usual bacteriological procedures, and the minute differences in certain biochemical characters were of little or no diagnostic value. In cross-inoculation experiments, Phaseolus vulgaris and Dolichos lablab were susceptible. This is the first record for D. lablab.

380. SAL'NIKOVA, A. F. 1958. (Methods for analyzing soy seeds for diseases). Dal'nevost. Nauch.-Issled. Inst. Sel'sko. Khoz., Biul. Nauch.-Tekhn. Inform. 6: 11-12. Russian text.

Ascochyta sojaecola Abram. and Pseudomonas glycinea Coerper cause two of the most dangerous diseases in the Soviet Far East. Sclerotinia libertiana Fckl. and Xanthomonas phaseoli var. sojense are also listed as serious pathogens.

381. SATO, K. and T. SHOJI. 1959. Sclerotial root-rot of coniferous seedlings caused by Sclerotium bataticola Taub. Meguro (Tokyo) Govt. Forest Expt. Sta., Bull. 111: 51-72. Japanese text. English summary.

One of the isolates used for inoculation studies was taken from soybeans affected by charcoal rot (Macrophomina phaseoli). Some of the experiments conducted were on: growth of the fungus on different media and showing temperature ranges and effect of relative humidity; influence of pH; effect of soil moisture; and toxicity of fungicides.

382. SATTAR, A. 1952. Connection of Rhizoctonia bataticola (Taub) Butler the causal fungus of root rot of cotton and some other isolates of R. bataticola with the pycnidial stage of Macrophomina phaseoli (Maubl.) Ashby. Pakistan Jour. Sci. Res. 4: 31-35.

Isolates of R. bataticola from cotton, tobacco, chillies, citrus, and sesamum were inoculated on to soybeans and 8 other plant crops. All became infected and all of the isolates produced sclerotia on these hosts except sesamum, where both sclerotia and pycnidia were produced. The pycnidial stage was identified as Macrophomina phaseoli (Maubl.) Ashby. Soybeans were susceptible when inoculated.

383. SAVULESCU, T. 1948. (Soybean mildew. A new disease of soybeans in Romania.) Bucharest Acad. Romana Sect. Sti., Bull. 30: 493-498. French text.

Peronospora manshurica (Naoum.) Syd. was found on the experimental grounds of the School of Agr. of Feldioara in August, 1946. A taxonomic description with illustrations, epiphytology, and suggestions for control are given.

384. SAWADA, K. 1931. Materials of the Formosan fungi (28) Formosa Nat. Hist. Soc., Trans. 21: 227-235. Japanese text.

Mycological notes on Phakopsora sojae (P. Henn) Sawada comb. nov. Synonym: Uredo sojae P. Henn (pp. 230-233)

385. SAWADA, K. 1958. Researches on fungi in the Tohoku District of Japan. (IV) Fungi Imperfecti. Tokyo Gov. Forest Expt. Sta. Meguro, Bull. 105: 35-140. Japanese text.

Short notes on fungi parasitic on soybean: Ascochyta phaseolorum Sacc. (p. 52), Colletotrichum glycines Hori (p. 73), Phyllosticta sojicola Massal. (p. 43), and Septoria glycines Hemmi (p. 60).

386. SAWADA, K. 1959. Descriptive catalogue of Taiwan (Formosan) fungi. Part XI. Natl. Taiwan Univ. (Taipei) Col. Agr., Spec. Bull 8. 268pp.

The occurrence of the following are noted: Cercospora canescens Ellis & Martin, on leaves (p. 214); Peronospora manshurica (Naum.) Syd. on leaves. (p. 14). Taxonomic descriptions are given of: Ascochyta phaseolorum Sacc. on leaves (p. 151); A. sojae Miura (Syn. A. glycine Miura in Ideta) on petioles. (pp. 151-152); Cercospora kikuchii Mats. & Tomoyasu on leaves, stems and pods (p. 220); Guignardia sojae Saw. (a new species without a Latin diagnosis) lesion girdling stems (p. 60); Mycosphaerella sojae Hori on leaves (p. 65); Phyllosticta glycineum Tehon & Daniels on leaves (p. 137); P. sojaecola Massal. on leaves (p. 143); Pleosphaerulina glycines Saw. (a new species but no Latin diagnosis) on leaves (p. 68).

387. SCHMITTHENNER, A. F. 1958. Root rot is still threatening State's soybean crop. Ohio Farm and Home Res. 43(313): 58-59, 62.

388. SCHMITTHENNER, A. F., and J. W. HILTY. 1962. A method for studying post-emergence seedling root rot. Phytopathology 52: 177-178.

Inoculum-layer technique. Plastic pots used to avoid drying out of soil. Six cm. of loose-steamed soil placed in pot and saturated by filling the pot with water and allowing the pot to drain. A 15-cc, 7-day-old petri plate culture of Phytophthora megasperma var. sojae was removed from the dish and placed intact on the soil. The inoculum layer was covered with 2 cm of loose soil, which was watered until saturated. Soybean seeds were pressed into the surface and covered with 1 cm of loose soil. Pots were covered with white paper until the seedlings emerged. Paper removed and pots watered as needed. Ten to fourteen days after planting, susceptible plants were dead or severely stunted with dark brown vascular rot.

Best media for this technique was dilute V-8 juice agar.

Also satisfactory was dilute lima bean agar containing 20 g/l of plain agar plus either 2.5 g/liter of Difco lima bean agar or the extract of 5 g/liter dried lima beans, prepared by autoclaving at 15 psi for 30 minutes and decanting the supernatant.

389. SCHMITTHENNER, A. F. 1963. Phytophthora root rot, a threat to soybean production that can be eliminated. Soybean Digest 23(10): 20, 22-23.

390. SCHMITTHENNER, A. F. 1964. Fungi associated with root necrosis of Phytophthora-resistant soybeans. Phytopathology (Abs) 54: 906.

Most of the infected roots yielded Pythium ultimum, but Rhizoctonia, Fusarium, and Thielaviopsis were also obtained.

391. SCHULTZ, H. 1950. (Role of Pythium species as pathogens of Lupine footrot. II. Results of infection experiments.) Phytopath. Zeitschr. 17: 200-214. German text.

One hundred isolates of Pythium spp. were used on a number of plant species. Tests in the greenhouse agreed closely with those made in the field. On soybeans, Pythium debaryanum infection was classed as very severe; P. irregulare was less virulent but classed as rather severe. (Germany)

392. SEAMAN, W. L., and R. A. SHOEMAKER. 1964. Corynespora cassiicola on soybean in Ontario. Plant Dis. Rptr. 48: 69.

Found on roots of soybean plants at Harrow and at Ottawa. (Sporulating on roots).

393. SEMANCICK, J. S., and J. B. BANCROFT. 1964. Further characterization of the nucleoprotein components of bean pod mottle virus. Virology 22: 33-39.

In soybeans and beans.

394. SEMENIUK, G. 1958. Three destructive foliage diseases of soybeans in South Dakota. S. Dak. Farm & Home Res. 9: 3-5.

395. SERZANE, M. 1962. (Plant Diseases. Practical Studies.) 518pp. Riga Latvijas Valsts Izdevniecoba. Latvian text.

Contains a key to the diseases of soybeans in Latvia and taxonomic notes on: Ascochyta sojaecola Abr.; Cercospora sojina Hara; Colletotrichum glycines Hori; Fusarium spp.; Peronospora manshurica (Naum.) Syd.; Pseudomonas glycinea (Coerper) Stapp.; P. solanacearum E. Smith; Sclerotinia libertiana Fckl.; Septoria glycines T. Hemmi; Uromyces sojae (P. Henn.) Syd.; and soybean mosaic. (pp. 326-329)

396. SHERWIN, H. S., and K. W. KREITLOW. 1952. Discoloration of soybean seeds by the frogeye fungus, Cercospora sojina. Phytopathology 42: 568-572.

397. SHURTLEFF, M. C. 1963. Spot and stop soybean diseases. I. The roots and stems. Crops & Soils 15(7): 10-13.

398. SINHA, R. C. 1960. Red clover mottle virus. Ann. Appl. Biol. 48: 742-748.

When soybean primary leaves are inoculated experimentally, the plants show symptoms similar to those of soybean mosaic. Soybean mosaic virus is restricted to soybeans. There was no evidence of seed transmission of red clover mottle virus in soybeans. (Rothamsted Exptl. Sta., England)

399. SMARTT, J. 1960. Some factors limiting the production of edible legumes in Northern Rhodesia. Rhodesia & Nyasaland Dept. Res. & Spec. Ser., Proc. Annu. Conf. Prof. Off. 4: 10-15.

The crop has been markedly free from disease except for Pseudomonas glycinea.

400. SMARTT, J. 1960. A guide to soya bean cultivation in Northern Rhodesia. Rhodesia Agr. Jour. 57:459-463.

Ascochyta sp., Mycosphaerella, Phyllosticta, and Pyrenochaeta are reported as causing minor leaf diseases. Sclerotium rolfsii is usually of minor importance. Mosaic is noted as being seed-borne and infected plants should be removed from seed production fields.

401. SMITH, K. M. 1952. Some garden plants susceptible to infection with cucumber mosaic virus. Royal Hort. Soc. (London) Jour. 77: 19-21.

Chrysanthemum mosaic virus: Soybean is susceptible when inoculated. This virus is not quite the same as that of cucumber mosaic virus, but is closely related.

402. SMITH, K. M. 1957. A text book of plant virus diseases. J. A. Churchill, Ltd., London, 652 pp.

403. SMITH, P. E., and A. F. SCHMITTHENNER. 1959. Further investigations of the inheritance of resistance to Phytophthora rot in the soybean. Agron. J. 51:321-323.

Phytophthora sojae (P. megasperma var. sojae).

404. SMITH, P. E. 1962. Registration of Henry (No. 34), Madison (No. 35), and Ross (No. 36) soybeans. Crop Sci. 2:534.

Resistant to Phytophthora (Ohio-developed varieties).

405. SPASIC, M. 1961. A contribution to the knowledge of the parasitic flora of the region Timocka Krajina, (Yugoslavia). Zashtita Bilja 63/64: 57-63. Croatian text, English summary.

During the 1960/61 season minor attacks by Alternaria sp., Bacterium phaseoli E.F.S., and by soybean mosaic and intensive attacks by Peronospora manshurica were noted.

406. STANDEN, J. H. 1952. Host index of plant pathogens of Venezuela. USDA Plant Dis. Rptr. Suppl. 212: 59-106.

The following are reported on Glycine max: Ascochyta pisi Lib., Cercospora glycines Cke., Cercospora sojina Hara, Pseudomonas glycinea Coerper, Rhizoctonia microslerotia Matz, Sclerotium rolfsii Sacc., and mosaic (virus).

407. STEERE, R. L. 1953. Tobacco ringspot virus, a polyhedron, purified with the use of butanol. (Abs.) Phytopathology 43: 485.

408. STEWART, R. B. 1957. An undescribed species of Pyrenochaeta on soybean. Mycologia 49: 115-117.

Report from Ethiopia describes a hitherto undescribed Pyrenochaeta, P. glycines n. sp., with pycnidia 110-160 μ in diameter, and hyaline (greenish-yellow in mass), oval to short-cylindrical, straight to slightly curved pycnidiospores measuring 2-3 x 4.5-7.5 μ.

The spots appear as small, dark reddish-brown, circular to irregular lesions. The older ones are necrotic, gray to dark brown in the center, and have a dark brown, almost black, narrow border. Some lesions are surrounded by a chlorotic halo. The center, sprinkled with small, black pycnidia visible macroscopically, may fall out in old lesions. The spots measure up to two cm. in diameter, but may coalesce and cover the greater part of the leaf surface. The affected leaves become chlorotic and fall. Varieties with pale leaves are generally more susceptible than those with dark ones. The fungus was also found on uncultivated Glycine javanica in the vicinity. (Adapted from Rev. Appl. Mycol. 36: 569. 1957.)

409. SUHOVECKY, A. J., and A. F. SCHMITTHENNER. 1955. Soybeans affected by early root rot. Ohio Farm & Home Res. 40: 85-86.

Phytophthora rot.

410. SUN, S. D. 1958. (Soybean) 248pp. Moscow. Russian text.

In chapt. 13 (pp. 231-240) of this work translated from the Chinese, pests and diseases of soybean in China are recorded, with short notes on symptoms, distribution and control. Among those listed are soybean mosaic virus, Cercospora sojina, Peronospora manshurica, Xanthomonas glycines, Septoria glycines, and Uredo sojae. (Rev. Appl. Mycol. 40: 391. 1961).

411. SYDOW, H. & P., and E. J. BUTLER. 1912. Fungi Indiae orientalis. IV. Ann. Mycol. 10:243-280. (German text).

Peronospora trifoliorum De Bary collected on leaves in Kashmir, 1908. First report for Glycine. Conidia 18-24 x 16-18 microns. Oospores smooth, brown, thick-walled, 28-31 microns diameter.

412. TAI, F. L. 1939. Notes on Chinese fungi. IX. Lingnan Sci. Jour. 18: 457-462. English text.

Erysiphe glycines, a new species, description in English and Latin. It resembles E. polygoni DC but differs in the subcylindrical asci which are 6-8 spored, usually 6. Collected in Szechwan, Nov. 1938.

413. TAI, F. L. 1947. Uredinales of Western China. Farlowia 3: 95-139.

Phakopsora pachyrhizi was collected in Yunnan and Hunan. The uredospores of the Chinese form are slightly larger and the teliospores smaller than those in the original diagnosis.

414. (TAKAHASHI, K., T. TANAKA, and K. HANDA) 1964. (The mosaic and curl viruses from soybeans from the Northeast area.) Soc. Plant Protect. N. Japan, Annu. Rpt. 15: 42-44. Japanese text.

415. TANI, T., and N. NAITO. 1956. On the nitrogen content of plants infected with several rust fungi. Kagawa Agr. Col. (Japan), Tech. Bull. 7: 141-143. Japanese text, English summary.

Experiments with downy mildew (Peronospora manshurica (Naoum.) Syd.) showed that infected plants were little different from healthy ones in the nitrogen content.

416. TARR, S. A. J. 1952. Diseases of fruit and vegetables in the Anglo-Egyptian Sudan. Sudan Min. Agr., Bull. 8. 109 pp.

Soybean is cultivated on a small scale and experimentally in many parts of the Sudan. It is often attacked by bacterial blight (sic) in the Gezira and Southern Sudan. (p. 47) This bacterium appears to be a distinct strain and is usually termed Xanthomonas phaseoli var. sojense (p.35).

417. TARR, S. A. J. 1955. The Fungi and Plant Diseases of the Sudan. 127pp.

Cercospora canescens causes leaf spotting on a wide range of leguminous plants, including soybean, in the southern and central Sudan and occurs as far north as Gezira.

418. TASUGI, H., and S. MOGI. 1958. Resistance of soybean leaves to the scab, caused by Sphaceloma glycines. Phytopath. Soc. Japan, Ann. 23: 159-164. Japanese text, English summary.

When susceptible varieties are inoculated, the causal fungus penetrates into the epidermal cells of the leaves, stems, and petioles by the infection peg produced from the germ tube within 24 hrs. after inoculation. The hyphae spread gradually into the palisade and spongy tissue. Within infected cells the chloroplasts decrease, the nucleus collapses, and the cytoplasm turns brown and coagulates. Sporulation occurs about 2 weeks after inoculation. In resistant varieties only the epidermal cells are invaded, on young or old leaves, and the palisade and spongy tissue are generally free of infection.

419. THIRUMALACHAR, M. J., and C. CHUPP. 1948. Notes on some Cercospora of India. Mycologia 40: 352-362.

Cercospora sojina Hara (C. daizu Miura) collected on leaves of Glycine javanica L., Aug. 1945 at Bangalore, Mysore State, at an altitude of about 3000 ft. Annual rainfall about 30 in.

420. THOMPSON, A. 1928. Report of the Mycologist in Annual Reports for 1927 of Heads of Divisions of the Department of Agriculture, Federated Malaya States and Straits Settlements. Malayan Agr. Jour. 16: 161-168.

Sclerotium rolfsii recorded in Malaya.

421. THOMPSON, A., and A. JOHNSTON. 1953. A host list of plant diseases in Malaya. Commonwealth Mycol. Inst., Mycol. Papers 52. 38pp.

Cites the occurrence on soybean of: Corticium solani (Prill. & Delacre.) Bourd. & Galz. (collar rot); Mycosphaerella sp. (leaf spot); Phakopsora vignae (Bres.) Arth. (rust); and Sclerotium rolfsii Sacc. (wilt).

422. THREINEN, J. T., T. KOMMEDAHL, and R. J. KLUG. 1959. Hybridization between radiation-induced mutants of two varieties of Diaporthe phaseolorum. Phytopathology 49: 797-801.

Separation of D. phaseolorum into 2 varieties on the basis of morphological differences in culture or pathogenicity on soybeans is considered invalid. Non-sporulating mutants of both varieties resulted from irradiation. Self-sterile mutants of the variety caulivora behaved in crosses with parent types of both varieties as if heterothallic, indicating that the homothallism ascribed to the variety caulivora is not a constant character. Mutants of var. caulivora crossed with the var. sojae produced perithecia that had the morphological characters of var. sojae. Most mutants were less pathogenic than the parents on soybean; some were equally pathogenic. Mutants of the var. caulivora produced symptoms on soybeans that were indistinguishable from symptoms produced by the var. sojae making this an unreliable character for varietal separation.

423. TIFFANY, LOIS H. 1951. Delayed sporulation of Colletotrichum on soybean. Phytopathology 41: 975-985.

424. TIFFANY, LOIS H. 1951. The anthracnose complex on soybeans. Iowa St. Coll. J. Sci. 25: 371-372.

Summary of doctoral thesis. Reported that Colletotrichum truncatum, C. destructivum, and Glomerella glycines commonly cause anthracnose of soybeans in Iowa. Seed-borne inoculum may bring about the symptomless establishment of internal mycelium as well as pre-emergence killing and seedling blight.

Cross-inoculations were made with these and other anthracnose fungi occurring on common legumes. Red clover, soybean, alfalfa, and sweet clover were susceptible to C. trifolii, C. destructivum, C. truncatum and C. graminicola.

The conidial stage of G. glycines is not C. glycines, but a straight-spored form similar to C. destructivum.

425. TIFFANY, LOIS H., and J. C. GILMAN. 1954. Species of Colletotrichum from legumes. Mycologia 46: 52-75.

Successful cross-inoculations with cultures of Colletotrichum truncatum from Lima bean were made on soybean, alfalfa, sweet clover, Lima bean and pea. Inoculations with the soybean isolates caused a rapid breakdown of the tissues of alfalfa, sweet clover and red clover, and infected soybean, lespedeza, ladino clover, bird's foot trefoil, Lima bean, and pea. The soybean isolate was isolated from green plants of various species, none of which showed any disease.

426. TIMNICK, M. B., V. G. LILLY, and H. L. BARNETT. 1951. Factors affecting sporulation of Diaporthe phaseolorum var. batatatis from soybean. Phytopathology 41: 327-336.

Report the formation of pycnidia containing almost entirely beta spores on most media, and their production on certain media was increased by exposure to ultra-violet irradiation. They failed to form in continuous darkness. Alpha spores were produced in abundance only on soybean stems and pods.

426A. TOCHINAI, Y. and I. HARA. 1944. A list of parasitic fungi collected in the territory of Mō-Kyō, the Inner Mongolia, in the summer of 1942. Sapporo (Japan) Soc. Agr. & For., Jour. 36 (3): 91-97.

Merely cites the occurrence of Septoria glycines Hemmi on Glycine max, Collected Aug. 19. Only the most conspicuous parasitic fungi were reported in this article. (p. 95)

426B. TROPOVA, A. T. 1929. The active acidity of the cell sap of some plants and their susceptibility to fungus and bacterial infection. Jour. Agr. Res. North Caucasus 13: 3-16. Russian text. English summary (p. 344).

The cell-sap of the leaves of 18 varieties of soybeans were checked and the pH varied from 5.72 (a variety with a 58.3% infection by Bacterium sojae) to 6.32 (a variety showing no infection). The author checked the pH relationships between fungi and bacteria on various economic crops and summarizes, in part: In the selection of varieties, which are resistant to diseases, the determination of the pH value of the cell-sap might be used as one of the factors on which a selection may be based.

427. TUITE, JOHN. 1960. The natural occurrence of tobacco ringspot virus. Phytopathology 50: 296-298.

428. TURNER, G. J. 1964. New records of plant diseases in Sarawak for the year 1962. Gardens' Bull. (Singapore) 20: 369-376.

One record of leaf rot (Corticium solani) on soybean and Glycine javanica and one record of wilt and pod rot (Sclerotium rolfsii) on soybean.

429. UEHARA, K. 1958. On the phytoalexin production of the soybean pod in reaction to Fusarium sp., the causal fungus of pod blight. I. Some experiments on the phytoalexin production as affected by host plant conditions and on the nature of phytoalexin produced. Phytopath. Soc. Japan, Ann. 23: 225-229. Japanese text, English summary.

Drops of spore suspension of Fusarium were mounted on the inner surface of the seed cavities of pods at different ages, and after centrifuging, the supernatant was tested for inhibitory action on the germination of fresh spores of Fusarium. It was found that the phytoalexin diffused distinctly into the drops placed on the young, unmatured pods, but hardly or not at all into the drops on the mature pods. The phytoalexin productivity of the host tissue was determined by changing daily the drops placed on given points of young pods with new spore suspension, and by measuring the inhibitory action of the diffusates each day. It was shown that the production of phytoalexin decreased remarkably on the second day and sank nearly to zero on the fourth day. Phytoalexin in the diffusate from the pods lost most of its inhibitory activity when heated to 100°C for 5 min. or diluted 1:8.

430. UEHARA, K. 1959. On the photoalexin production of the soybean pod in reaction to Fusarium sp., the causal fungus of pod blight. II. On the effect of conditions of the spore suspension of the causal fungus upon phytoalexin production. Phytopath. Soc. Japan, Ann. 24: 224-228. Japanese text, short English summary.

Phytoalexin was produced abundantly when suspensions containing Fusarium spores of more than 40 per microscope field (X 150) were placed on the soybean pod; phytoalexin was not produced when suspensions contained from 3 to 6 spores per field or a spore suspension was heated at 100°C for 10 min. or a supernatant from a suspension of macerated spores was used. The supernatant of a spore suspension incubated for 24 hrs at 23°C was able to induce phytoalexin production but lost the ability when heated for 10 min. at 60°C.

431. UPPAL, B. N., M. K. PATEL, and M. N. KAMAT. 1935. The fungi of Bombay. Bombay Dept. Agr., Bull 176. 56pp.

States that Corticium solani has been reported on soybean in Mirpurkhas.

432. VANCHIKOV, K. T. 1941. (New parasitic fungi for Bulgaria. 1st contribution.) Spis. Zeml. Opitni. Inst. v. Bulgariia 11(4): 33-43. Bulgarian text, German summary.

First report for Bulgaria of Phyllosticta sojicola collected in August, 1941. Taxonomic notes, etc. (p. 36).

433. VASUDEVA, R. S. 1963. Indian Cercosporae. 245pp. illus. New Delhi.

Taxonomic description with figures of Cercospora sojina Hara on Glycine javanica L. This species is distinct from C. cruenta Sacc., C. flagellifera Atkinson, C. kikuchii Matsumoto & Tomoyashi, and C. glycines Cooke on Glycine spp. in having hyaline, cylindric, and wide conidia (p. 181-182).

434. VASUDEVA, R. S. 1963. Division of mycology and plant pathology. Indian Agr. Res. Inst. (New Delhi), Sci. Rpts. 1961: 87-100.

First report of Corynespora cassiicola on Glycine max for India. (p.98).

435. VERMA, G. S., J. P. VARMA, and P. N. SAXENA. 1962. Top necrosis of Cyamopsis tetragonoloba (L.) Taub. India Natl. Acad. Sci., Proc. Sect. B., 32: 287-292.

Soybean is susceptible when inoculated. May be a strain of tobacco ringspot virus.

436. VOROS, J., and B. MOLNAR. 1958. Peronospora manshurica (Naumoff) Sydow, a disease of soybeans new to Hungary. Novenytermeles 7: 371-374. Hungarian text, English summary.

A description of symptoms, a literature review, the taxonomy, biology and spread of the pathogen are given. The early varieties seem to be more susceptible than the late ones.

437. VUI-YUI, D. 1961. The mosaic disease of the soybean varieties in Bulgaria. Rast. Zasht. (Bulgaria) 9(1): 20-26. Bulgarian text, Eng. summary.

Various symptoms on all the varieties of soybean were caused by Soja virus 1. The different varieties react to the virus in a different manner with temperature playing a certain role too.

437A. VZOROV, V. I. 1938. Species and distribution of bacteriosis of agricultural plants in the Soviet Union. Akad. Sel'skokh. Nauk im V. I. Lenina Inst. Zashch. Rast., Izvest. Rostov. Stants. Zashch. Rast. 9: 87-91. Russian text.

Bacteria reported on soybeans are: Bacterium lathyri in the Azov-Black-Seas area; and B. phaseoli var. sojense in Karachai, Lenningrad Oblast and the Azovo-Black-Seas area. B. heteroceum and B. medicaginis var. phaseolicola on soybean are grouped together with other hosts and reported as to localities from which the bacteria are known to occur.

438. WALLACE, G. B. 1939. Plant diseases spread by bugs. East African Agr. Jour. 4: 268-271.

As of 1937, Nematospora coryli Pegl. and N. gossypii A. & N. have been reported on soybeans in the Belgian Congo and South Africa. Spread by insects in the sub-order Hepteroptera.

439. WALLEN, V. R. 1960. A high incidence of Diaporthe phaseolorum occurring in the seed of soybeans from southwestern Ontario. Plant Dis. Rptr. 44: 596.

440. WALLEN, V. R., and T. F. CUDDY. 1960. Relation of seed-borne Diaporthe phaseolorum to the germination of soybeans. Assoc. Off. Seed Anal., Proc. 50(1): 137-140.

441. WALLEN, V. R., and W. L. SEAMAN. 1962. Diaporthe phaseolorum in soybean seed. (Abs.) Proc. Canad. Phytopath. Soc. 29: 11-20. (18).

Seed treatment improved germination only when levels of infection were greater than 42%. Storage for 2 years at 10° C. restored the germination of heavily infected seed to a satisfactory level.

442. WALLEN, V. R., and W. L. SEAMAN. 1963. Seed infection of soybean by Diaporthe phaseolorum and its influence on host development. Canad. J. Bot. 41: 13-21.

443. WALTERS, H. J. 1958. A virus disease complex in soybeans in Arkansas. (Abs.) Phytopathology 48: 346.

Collected in 1955-56. Symptoms include green mottling, poor pod development, floral bud proliferation, nodal swelling, dropping of immature pods, and failure of plants to mature. Differential host reactions and physical properties indicated the presence of the viruses of soybean mosaic, pod mottle, yellow stipple, and a 4th unidentified virus.

444. WALTERS, H. J. 1961. Phytophthora rot of soybeans. Ark. Farm Res. 10(2): 2.

Phytophthora sojae (P. megasperma var. sojae).

445. WALTERS, H. J. 1962. Variations in isolates of tobacco ringspot virus from soybeans. Phytopathology 52 (Abs.): 31-32.

446. WALTERS, H. J. 1963. Leguminous hosts of soybean mosaic virus. Plant Dis. Rptr. 47: 726-728.

Seven new species of legumes were found to be systemically susceptible to soybean mosaic virus.

447. WALTERS, H. J. 1964. Transmission of bean pod mottle virus by bean leaf beetles. Phytopathology 54: 240.

Transmitted from naturally-infected soybeans to bean (var. Black Valentine) and soybean var. Dortchsoy 67 by Ceratoma trifurcata.

448. WALTERS, H. J. 1964. Tobacco ringspot virus disease of soybeans. Ark. Farm. Res. 13(1): 3.

449. WANG, C. 1961. Chemical control of soybean rust. Agr. Assoc. China (Taiwan), Jour. 35: 51-54. Chinese text, English summary.

In experiments to test the effect of fungicides in 1959 and 1960, Dithane Z-78 gave the highest yield.

450. WATERHOUSE, GRACE M. 1963. Key to the species of Phytophthora de Bary. Commonwealth Mycol. Inst., Mycol. Papers. 92. 22 pp.

451. WATERSTON, J. M. 1939. Annotated list of diseases of cultivated plants in Bermuda. Bermuda Dept. Agr., (Bull. 18). 38 pp.

Reports dates of collections of: Peronospora manshurica (downy mildew) in 1927; Phoma sp. in 1923; Macrophomina phaseoli in 1927; and an undetermined bacterial spot in 1934.

452. WEI, C. T., and S. HWANG. 1939. A check list of fungi deposited in the Mycological Herbarium of the University of Nanking. I. (1924-1937). Nanking Jour. 9:329-372. English text.

Specimens received from Chinese provinces were: Colletotrichum glycines Hori and Septoria sojina Thuem. from Kiangsu; Peronospora manshurica from Chekiang, Hopeh and Kiangsu; and Uredo sojae P. Henn. from Chekiang.

453. WHITEHEAD, M. D., and M. J. THIRUMALACHAR. 1960. An undescribed smut disease of soybeans. Mycologia 52: 189-192.

A new species, Melanopsichium missouriense Whitehead & Thir.

454. WHITESIDE, J. O. 1960. Diseases of legume crops in Southern Rhodesia. Rhodesia & Nyasaland Dept. Res. & Spec. Ser., Proc Annu. Conf. Prof. Off. 4: 52-59.

Bacterial blight (Pseudomonas glycinea) can be troublesome in some seasons. The bacteria can survive on dead leaves from one growing season to the next. The following were of no great importance: stem blight (Ascochyta pisi Lib. affin.); root rot (Macrophomina phaseoli (Maubl.) Ashby. and Sclerotium rolfsii); and mosaic. (p. 54).

455. WIEHE, P. O. 1953. The plant diseases of Nyasaland. Commonwealth Mycol. Inst., Mycol. Papers 53. 39 pp.

Synchytrium sp., termed false rust, found on the leaves, especially the veins, of Glycine javanica L. Collected at Lilongwe. (p. 17)

456. WILLIAMS, T. H. 1964. (New records of diseases and fungi in Sabah.) FAO Plant Protect. Comm. South East Asia & Pacific Region, Quart. Rept. for Jan.-March 1964: 8.

Leaf rot (Corticium solani) on Glycine javanica. First report for Sabah, (Malaya).

457. WOOLEY, D. W., G. SCHAFFNER, and A. C. BRAUN. 1955. Studies on the structure of the phytopathogenic toxin of Pseudomonas tabaci. J. Biol. Chem. 215: 485-493.

458. WU, L.-C., W.-C. TIEN, and Y.-S. LIN. 1964. Seed-borne diseases of soybean in Taiwan. I. Factors affecting the isolation of causal organisms. Acad. Sinica. Inst. Bot. (Taiwan), Bot. Bull. (N.S.) 5: 42-53. English text.

Studies on the rinsing of seed in sterile water, selection of media, application of chemicals with regard to concentration and length of time applied, and temperature for incubation were extensively carried out.

459. WU, L.-C., Y.-S. LIN, and K.-Y. CHIU. 1964. Seed-borne diseases of soybean in Taiwan. II. Survey of the seed-borne pathogens from soybean seeds. Acad. Sinica Inst. Bot. (Taiwan), Bot. Bull. (N.S.) 5: 105-112. English text.

Sixteen out of 25 lots of seed samples sown grew stunted seedlings showing characteristics of bud blight (tobacco ringspot virus). Infection was as high as 98%. Alternaria, Cercospora, Cladosporium and Fusarium were the fungi most frequently isolated from seed, but seedlings grown on autoclaved soil did not show a comparable number of fungal infections.

Other fungi isolated from the seeds were: Cephalothecium, Colletotrichum, Corynespora, Curvularia, Nigrospora, Penicillium, Pestalozzia, Phyllosticta, Rhizoctonia, and Stemphylium.

460. WYLLIE, T. D., and R. W. GOTH. 1959. Treatment of soybean seed in Minnesota. Plant Dis. Rptr. 43: 898-902.

461. WYLLIE, T. D., and D. P. TAYLOR. 1960. Phytophthora root rot of soybeans as affected by soil temperature and Meloidogyne hapla. Plant Dis. Rptr. 44: 543-545.

462. WYLLIE, T. D. 1961. Host-parasite relationships between soybean and Rhizoctonia solani. Diss. Abs. 21(10): 2854.

463. WYLLIE, T. D. 1962. Effect of metabolic by-products of Rhizoctonia solani on the roots of Chippewa soybean seedlings. Phytopathology 52: 202-206.

464. YAMAMOTO, W., and M. MAEDA. 1960. Cercospora species in Japan. Hyogo Univ. Agr. Sci. Rpts. Ser.: Agr. Biol. 4: 41-91.

Cercosporas (with taxonomic notes in Japanese) on soybeans are: C. canescens Ellis & Martin (Syn.: C. vignicaulis Tehon) (p. 48); C. kikuchii T. Matsu & Tomoyasu (Syn.: Cercosporina kikuchii T. Matsu & Tomoyasu, (p. 62); and Cercospora sojina Hara (Syn.: C. daizu Miura & Cercosporina sojina Hara)(p. 74)

464A. YOSHINO, K. 1905. A list of the parasitic fungi collected in the Province of Higo (Japan). Bot. Mag. (Tokyo) 19: (87)-(103) & (199)-(222). Japanese text.

Records on soybeans of: Ascochyta sp., p. (210); Cercospora sp., p. (218); Gloeosporium sp., p. (214); Hypochnus cucumeris, p. (201); Isariopsis griseola, p. (221); Nectria ipomeae, p. (208); and Peronospora viciae, p. (89).

465. YU, T. F. 1955. A preliminary list of Fusaria in China. Acta Phytopath. Sinica 1: 1-18. Chinese text, short English summary.

Cites the occurrence of Fusarium bulbigenum var. tracheiphilum.

466. YUROVA, MME. N. F. 1962. (On the systematic position of the genus Phytophthora). Bot. Zhur. (SSSR)

467. ZAIANCHKOVSKAIA, M. S. 1938. (Diseases of soybeans in the Ukraine.) Moscow Vsesoiuz. Nauch.-Issled. Inst. Severnogo Zernovogo Khoz. i Zernobob. Kul'tur, Trudy 3:5-22. Russian text.

Notes are given on: Alternaria sp., at times semiparasitic on leaves; Ascochyta sojaecola on wilting plants; Bacterium sojae Wolf, causes cotyledon bacteriosis and rusty leaf spot; Fusarium spp., on cotyledons and semiparasitic or saprophytic on seeds; Fusarium tracheiphilum, causes wilt; Peronospora manshurica (Naum.) Syd., isolated from wilting plants; Phyllosticta sojicola Mass., on wilting plants; (crimped leaves), a virus that causes unequal development of the leaflet lamina along middle and lateral veins; and (leaf roll) a virus that causes the edge of the leaf to turn downwards.

468. ZALASKY, H. 1954. Infection studies in Septoria glycines Hemmi. (Abs.) Canad. Phytopath. Soc., Proc. 22: 19.

469. ZEVADA, M. Z., W. D. YERKES, JR., and J. S. NIEDERHAUSER. 1955. (First list of fungi of Mexico. Arranged by hosts.) Mex. Ofic. de Estud. Espec. Fol. Tec. 14. 43 pp. Spanish text.

Occurrence of Pellicularia filamentosa.

470. ZSCHAU, K. 1964. (A contribution to the occurrence of alfalfa mosaic virus in Germany.) Nachrichtenbl. f. den Deut. Pflanzenschutzd. (Berlin), N.F., 18: 44-48. German text.

On the variety Black Eye, inoculation of an isolate from Melilotus alba caused pinhead-sized, dark brown necrotic local lesions, with no systemic reaction. An isolate from Chenopodium album caused vein necrosis of the inoculated leaves and a systemic reaction of chlorosis of the entire plant.

APPENDIX

PATHOGENS AND DISEASES

General (Bulletins, Indexes, etc.)

Literature: 4, 19, 21, 22, 23, 25, 34, 35, 38, 40, 50, 57, 68, 70, 76, 78, 79, 84, 85, 90, 93, 94, 100, 102, 104A, 105, 106, 107, 109, 110, 112, 122, 131, 133, 140, 141, 161, 162, 167, 176, 177, 195, 202, 209, 210, 211, 212, 216, 217, 234, 242, 261, 266, 274, 283, 286, 287, 295, 296, 302, 317A, 318, 326, 339, 340, 341, 342, 342A, 349, 363, 372, 374, 386, 387, 394, 395, 397, 402, 406, 409, 414, 417, 421, 433, 451, 452, 456, 464, 464A, 467.

Virus Diseases

1. General
   Literature: 43, 44, 46, 54, 71, 72, 76, 80, 82, 99, 115, 186, 197, 197A, 199, 229, 252, 253, 254, 255, 256, 264, 266, 270, 284, 285, 346, 402, 443, 467.

2. Bean pod mottle virus-Pod mottle.
   Literature: 20, 38, 378, 393, 443, 447.

3. Bean yellow mosaic virus-Yellow mosaic. (Phaseolus virus 2)
   Literature: 38, 148, 252, 253, 266, 359.

4. Cowpea mosaic virus
   Literature: 97, 254, 375.

5. Soybean mosaic virus-Soybean mosaic. (Soja virus 1)
   Literature: 38, 44, 45, 46, 73, 76, 101, 103, 106, 131, 143, 145, 146A 185, 186, 193, 194, 251, 256, 262, 265, 266, 295, 315, 324, 346, 359, 369, 371, 395, 400, 405, 406, 409, 414, 437, 443, 446, 454.

6. Soybean reaction to other viruses.
   Literature: 38, 44, 54, 72, 73, 80, 82, 92, 99, 199, 251, 252, 253, 254, 255, 256, 263, 266, 284, 285, 323A, 398, 401, 435, 470.

7. Tobacco necrosis virus
   Literature: 368

8. Tobacco ringspot virus--Bud blight. (Nicotiana virus 12)
   Literature: 13, 14, 15, 29, 92, 116, 129, 223, 224, 300, 302, 303, 407, 427, 435, 445, 448, 459.

9. Tobacco streak virus.--Bud blight (Brazil)
   Literature: 81, 83.

Bacterial Diseases

1. Unidentified
   Literature: 123, 128, 146A, 258, 328, 328A, 416, 437A, 451.

2. Corynebacterium sp.--Wilt, stunt.
   Literature: 124, 125, 127.

3. Pseudomonas glycinea Coerper--Bacterial blight.
Syn.: Bacterium glycineum Coerper; Bacterium sojae Wolf; Phytomonas glycinea Burkh.; Phytomonas sojae Burkh: Pseudomonas sojae Stapp.
Literature: 28, 34, 35, 50, 59, 60, 61, 65, 91, 100, 106,119, 121, 131, 150, 152, 153, 154, 155, 157, 161, 193, 194, 195, 202, 222, 228, 233, 257, 259, 268, 268A, 315, 322A, 332, 345A, 354, 357, 366, 380, 395, 399, 406, 426B, 454, 467.

4. Pseudomonas glycinea var. japonica (Taki.) Burkh.
Syn.: Bacterium glycineum var. japonicum Elliott; B. sojae var. japonicum Takimoto; Phytomonas glycinea var. japonicum Magrou.
Literature: 141, 201, 338.

5. Pseudomonas phaseolicola (Burkh.) Dowson
Syn.: Phytomonas medicaginis var. phaseolicola Burkh.; Bacterium medicaginis var. phaseolicola (Burkh.) Link & Hull; Pseudomonas medicaginis var. phaseolicola (Burkh.) Stapp & Kotte.
Literature: 257, 437A.

6. Pseudomonas solanacearum E.F. Sm.
Syn.: Bacillus solanacearum E.F. Sm.
Literature: 257, 259, 321, 322A, 395.

7. Pseudomonas tabaci (Wolf & Foster) Stevens-Wildfire.
Syn.: Bacterium tabacum Wolf & Foster; Phytomonas tabacae (Wolf & Foster) Bergey.
Literature: 42, 47, 63, 64, 65, 152, 153, 154, 155, 220, 250, 357, 457.

8. Xanthomonas spp.
Literature: 33, 410.

9. Xanthomonas phaseoli var. sojensis (Hedges) Starr & Burkh.--Bacterial pustule.
Syn.: Bacterium phaseoli var. sojense Hedges; B. glycines Elliott; Phytomonas phaseoli var. sojense Burkh.; Phytomonas glycines Magrou; Pseudomonas glycines Nakato.
Literature: 64, 67, 76, 78, 79, 108, 131, 133, 134, 136, 150, 152, 153, 154, 155, 157, 161, 164, 165, 220, 222, 233, 268, 286, 287, 306, 307, 309, 322, 322A, 330, 332, 338, 343, 344, 357, 364, 379, 380, 437A.

Fungus Diseases

1. Alternaria spp.
Literature: 76, 106, 161, 353, 405, 459, 467.

2. Alternaria tenuissima (Nees ex Fr.) Wilts.
Literature: 326.

3. Aphysa rhynchosiae (Kalch. & Cooke) Theiss. & Syd.
Literature: 162.

4. Ascochyta phaseolorum Sacc.
Literature: 374, 385, 386.

5. Ascochyta pisi Lib.
Literature: 194, 195, 202, 336, 406, 454.

6. Ascochyta sojaecola Abramoff
Literature: 39, 131, 135, 274, 326, 333, 334, 380, 395, 467.

7. Botrytis sp.
Literature: 179.

8. Botrytis cinerea Pers.
Literature: 353.

9. Cephalosporium gregatum Allington & Chamberlain--Brown stem rot.
Literature: 62, 66, 160, 231, 299, 377.

10. Cercospora sp.
Literature: 104A, 221, 459, 464A.

11. Cercospora canescens Ell. & Mart.
Literature: 79, 286, 356, 386, 417, 464.

12. Cercospora cruenta Sacc.
Literature: 77, 162.

13. Cercospora flagellifera Atk.
Literature: 287.

14. Cercospora glycines Cke.
Literature: 77, 202, 315, 406.

15. Cercospora kikuchii (T. Matsu. & Tomoyasu)
Gardner- Purple stain, purple speck, purple seed stain.
Syn.: Cercosporina kikuchii T. Matsu. & Tomoyasu.
Literature: 45, 74, 76, 77, 104, 131, 142, 161, 201, 213, 217, 218, 219, 235, 237, 238, 271, 274, 275, 278, 286, 288, 288A, 313, 320, 323, 374, 386, 464.

16. Cercospora sojina Hara--Frogeye leafspot.
Syn.: C. daizu Miura.
Literature: 10, 16, 77, 131, 161, 201, 296, 304, 316, 317, 317A, 345, 358, 395, 396, 406, 410, 419, 433, 464.

17. Chaetoseptoria wellmanii Stev.
Literature: 360.

18. Colletotrichum glycines Hori- Anthracnose.
Literature: 106, 205, 295, 385, 395, 424, 452.

19. Colletotrichum truncatum (Schw.) Andrus & W. D. Moore--Anthracnose.
Literature: 217, 274, 423, 424, 425.

20. Corynespora cassiicola (Berk. & Curt.) Wei-Target spot, root and stem rot.
Syn.: Cercospora vignicola Kawam.; Helminthosporium vignae Olive, Bain & Lefebvre: Helminthosporium vignicola Olive.
Literature: 41, 130, 166, 286, 287, 392, 434.

21. Dactuliophora glycines Leakey.
Literature: 276.

22. Diaporthe phaseolorum (Cke. & Ell.) Sacc. var. caulivora Athow & Caldwell-Stem Canker.
Syn.: Diaporthe phaseolorum var. batatatis (Harter & Field) Wehm.
Literature: 5, 11, 12, 27, 86, 103, 111, 113, 114, 117, 118, 119, 138, 139, 175, 177A, 178, 180, 231, 422, 426.

23. Diaporthe phaseolorum (Cke. & Ell.) Sacc. var. sojae (Lehman) Wehm.-Pod and stem blight.
Syn.: D. sojae Lehman; Phomopsis sojae Lehman.
Literature: 11, 104A, 117, 131, 147, 177A, 178, 180, 274, 294, 422, 439, 440, 441, 442.

24. Erysiphe sp.
Literature: 188.

25. Erysiphe glycines Tai
Literature: 412.

26. Erysiphe polygoni DC.- Powdery mildew.
Literature: 25, 187.

27. Fusarium spp.
Literature: 142, 149, 161, 290, 296, 298, 353, 361, 395, 429, 430, 459, 465, 467.

28. Fusarium oxysporum Schlecht.-Wilt, root rot.
Syn.: F. orthoceras.
Literature: 7, 70, 76, 126, 131, 137, 161, 298, 327, 361, 467.

29. Glomerella glycines Lehman & Wolf-Anthracnose.
Literature: 76, 131, 161, 161A, 198, 201, 216, 373, 374, 424.

30. Helicobasidium mompa Tanaka-"Murasaki-mompa" disease.
Literature: 161, 204.

31. Hypochnus sasaki Shirai
Literature: 297.

32. Macrophoma mame Hara
Literature: 131, 141, 161.

33. Macrophomina phaseoli (Maubl.) Ashby-Charcoal rot.
Syn. Sclerotium bataticola Taub.
Literature: 2, 3, 9, 24, 32, 37, 89, 96, 131, 162, 194, 261, 267, 274, 292, 362, 367, 374, 381, 382, 451, 454.

34. Melanopsichium missouriense Whitehead & Thirum.-Soybean smut.
Literature: 453.

35. Meliola bicornis Wint.
Literature: 162.

36. Mycosphaerella spp.,
Literature: 217, 400, 421.

37. Mycosphaerella cruenta (Sacc.) Lan.
Literature: 161A, 287.

38. Mycosphaerella phaseolorum Siemszko
Literature: 79.

39. Myrothecium roridum Tode ex Fr.
Literature: 287, 319.

40. Nematospora coryli Peg.-Yeast spot.
Literature: 103, 438.

41. Ophionectria sojae Hare.
Literature: 131, 274.

42. Peronospora manshurica (Naoum.) Syd.-Downy mildew.
Syn.: P. trifoliorum d By. var. manshurica Naoum.; P. sojae Lehman & Wolf.
Literature: 8, 40, 75, 76, 94, 98, 103, 120, 131, 151, 158, 161, 173, 200, 201, 240, 274, 279, 280, 281, 318, 323, 329, 335, 337, 342, 347, 348, 352, 353, 355, 383, 386, 395, 405, 410, 411, 415, 436, 451, 452, 467.

43. Phakopsora pachyrhizi Syd.-Soybean rust.
Syn.: Phakopsora sojae Saw.; Uredo sojae P. Henn.; Uromyces sojae (P. Henn.) Syd.
Literature: 19, 36, 76, 93, 131, 161, 170, 189, 190, 191, 192, 196, 201, 215, 243, 244, 245, 245A, 274, 287, 337, 363, 384, 395, 410, 413, 421, 449,452.

44. Phoma spp.
Literature: 106, 451.

45. Phomopsis glycines Petrak
Literature: 351.

.46. Phyllosticta spp.
Literature: 95, 400, 459.

47. Phyllosticta sojicola Massal.-Phyllosticta leafspot.
Syn.: P. glycinea Tehon & Daniels (The ascigerous stage of the fungus, Pleosphaerulina sojaecola Miura, has been reported from the Orient but has not been found in the U.S.)
Literature: 203, 207, 217, 242, 282, 385, 386, 432, 467.

48. Phytophthora megasperma Drechs. var. sojae A. A. Hildeb.--Phytophthora rot.
Syn.: Phytophthora sojae Kaufmann & Gerdemann.
Literature: 18, 30, 31, 52, 53, 69, 144, 159, 163, 171, 172, 181, 182, 183, 184, 225, 246, 247, 248, 249, 310, 311, 387, 388, 389 403, 404, 409, 444, 450, 461, 466.

49. Pleosphaerulina glycines Sawada
Literature: 386.

50. Pyrenochaeta glycines R.B. Stewart-Leafspot.
Literature: 372, 400, 408.

51. Pythium aphanidermatum (Edson) Fitz.--Root and seedling rot.
Literature: 312.

52. Pythium debaryanum Hesse--Root and seedling rot, damping off.
Literature: 365, 366, 391.

53. Pythium irregulare Buisman
Literature: 365, 391.

54. Pythium ultimum Trow.--Root rot.
Literature: 174, 365, 390.

55. Rhizoctonia microsclerotia Matz.--Web blight.
Literature: 88, 406.

56. Rhizoctonia solani Kuehn--Root rot, serial blight.
Syn: Pellicularia filamentosa (Pat.) Rogers.
Literature: 17, 56, 131, 169, 206, 216, 230, 232, 293, 350, 366, 370, 421, 428, 431, 456, 462, 463, 469.

57. Rhizoctonia violacea Tul.
Literature: 194.

58. Sclerotinia sclerotiorum (Lib.) dBy.--Stem rot.
Syn.: S. libertiana Fuckel
Literature: 26, 48, 51, 58, 131, 146A, 156, 161, 308, 380, 395.

59. Sclerotium rolfsii Sacc.--Southern blight, Sclerotial blight.
Literature: 22, 23, 25, 70, 76, 100, 102, 106, 131, 195, 226, 277, 287, 305, 314, 315, 317A, 400, 406, 420, 421, 428, 454.

60. Septogloeum sojae Yoshii & Nishizawa--Soybean blast.
Literature: 131, 240A, 241, 260, 331.

61. Septoria glycines Hemmi--Brown spot, Septoria leafspot.
Literature: 28, 55, 103, 131, 201, 274, 289, 385, 395, 410, 426A, 468.

62. Septoria sojina Thuem.
Literature: 203, 336, 409, 452.

63. Sphaceloma glycines Kurata & Kuribayashi--Soybean scab, Sphaceloma scab.
Literature: 131, 208, 272, 273, 274, 418.

64. Synchytrium spp.
Literature: 455.

65. Synchytrium dolichi (Cooke) Gaum.
Literature: 79, 325, 326, 376.

66. Verticillium albo-atrum Reinke & Berthold--Tracheomycosis (Germany)
Literature: 146.

Seed Infection and Infestation

Literature: 104, 214, 227, 235, 236, 239, 258, 288, 289, 290, 353, 380, 441, 458, 459.

Seed Treatment

Literature: 23, 214, 258, 259, 288, 290, 291, 322A, 353, 441, 460.

Control (Chemical and Genetic)

Literature: 49A, 196, 243, 244, 245A, 268A, 269, 338A, 404, 429, 430, 449.

COMMON NAMES OF DISEASES CAUSAL ORGANISMS

1. Anthracnose--Colletotrichum glycines, C. truncatum, Glomerella glycines.
2. Bacterial blight--Pseudomonas glycinea, P. glycinea var. japonicum.
3. Bacterial pustule--Xanthomonas phaseoli var. sojensis.
4. Blast--Septogloeum sojae.
5. Brown spot--Septoria glycines.
6. Brown stem rot--Cephalosporium gregatum.
7. Bud blight--Tobacco ringspot virus, Tobacco streak virus (Brazil)
8. Charcoal rot--Macrophomina phaseoli.
9. Damping off--Pythium spp.
10. Downy mildew--Peronospora manshurica.
11. Frogeye leafspot--Cercospora sojina.
12. Mosaic--Soybean mosaic virus.
13. Murasaki mompa disease--Helicobasidium mompa.
14. Phyllosticta leafspot--Phyllosticta sojicola.
15. Phytophthora rot--Phytophthora megasperma var. sojae.
16. Pod and stem blight--Diaporthe phaseolorum var. sojae.
17. Powdery mildew--Erysiphe polygoni.
18. Purple stain--Cercospora kikuchii.
19. Root rot--Fusarium spp., Rhizoctonia solani, Pythium spp.
20. Rust--Phakopsora pachyrhizi.
21. Sclerotial blight, southern blight--Sclerotium rolfsii.
22. Scab, Sphaceloma scab--Sphaceloma glycines.
23. Smut--Melanopsichium missouriense.
24. Stem canker--Diaporthe phaseolorum var. caulivora.

25. Target spot--*Corynespora cassiicola*.

26. Wildfire--*Pseudomonas tabaci*.

27. Wilt--*Corynebacterium* sp.

28. Yeast spot--*Nematospora coryli*.

29. Yellow mosaic--Bean yellow mosaic virus.